Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices

UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN No. 179

Contribution from the Bureau of Plant Industry
WM. A. TAYLOR, Chief

Washington, D. C. PROFESSIONAL PAPER April 2, 1915

NATIVE AMERICAN SPECIES OF PRUNUS

By

W. F. WIGHT, Botanist

CONTENTS

	Page		Page
Introduction	1	Horticultural History and Development	6
Distribution	1	Systematic Botany	17
Variation and Adaptability	2	Literature Cited	73
Early History of American Plums	2		
Early Botanical Descriptions	5		

WASHINGTON
GOVERNMENT PRINTING OFFICE
1915

BULLETIN OF THE
U.S. DEPARTMENT OF AGRICULTURE

No. 179

Contribution from the Bureau of Plant Industry, Wm. A. Taylor, Chief.
April 2, 1915.

(PROFESSIONAL PAPER.)

NATIVE AMERICAN SPECIES OF PRUNUS.[1]

By W. F. Wight,
Botanist, Horticultural and Pomological Investigations.

INTRODUCTION.

The present study embraces only those species of the genus Prunus which have an umbellate or corymbose inflorescence and which produce plumlike or cherrylike fruit, these being the ones principally of interest, either from the standpoint of their fruit production or their utilization as stocks in the propagation of other species. Indeed, the American species belonging to the subgenera Padus, Laurocerasus, and Emplectocladus seem sufficiently distinct to warrant the recognition of these groups as genera. If connecting species exist, they are to be found among the Asiatic representatives of the genus, and no satisfactory conclusions can be reached regarding generic limitations without a careful study of the species in the Old World.

DISTRIBUTION.

The genus Prunus is widely distributed in America, being represented in some portion of every State by one or more species. One species is found in northeastern Mexico, and one or more occur in nearly all of the southern provinces of Canada. Eight species are found within the limits of Texas, and it is probable that the greatest abundance of individuals is in the region comprising Missouri, eastern Kansas, Oklahoma, western Arkansas, northwestern Louisiana, and eastern and northern Texas. The species naturally grow mainly in open situations, some of them scarcely at all with other woody plants, and rarely under forest conditions. In some sections of the country the clearing of the forests and the use of such areas

[1] This manuscript was prepared in 1911 while the writer was associated with the Office of Taxonomic and Range Investigations.

Note.—This bulletin is intended for horticulturists in all parts of the United States, especially those who are studying varieties or doing work in plant breeding.

for pasture have afforded favorable conditions for a considerable increase in the number of individuals. In other localities the abandonment of cultivated fields has afforded very similar opportunities, with a like result. In still other regions, areas are being placed under cultivation, and by this or other means the number of individuals is being decreased. The horticultural literature of the Northwest contains so many references to the destruction of plum thickets that it is probable that in that region at least the genus is less abundant than when settlement began. The actual number of species may also soon be lessened, since a few of them are extremely local, and at least one of the latter, *Prunus alleghaniensis*, is known recently to have disappeared in some of the localities where it formerly existed.

VARIATION AND ADAPTABILITY.

There is great variation within the species in the size and quality of the fruit and apparently in the productiveness of individual trees. Any systematic attempt to improve the native plums should begin with a study of the species in the field in at least a portion of the range of each. In this way forms may be secured which so far surpass the usual quality of the species that they could otherwise be obtained only after many years of selection in the orchard. Several of the American species bear fruit that is distinctive in character and that possesses qualities of value. Their hardiness and adaptability to the regions in which they are native render some of them indispensable if those regions in which the Old World species are not successfully grown are to be supplied with home-grown fruit. Some of these may eventually be so improved that they will even find a place in localities where they will compete for dessert purposes with varieties originating from Old World species.

EARLY HISTORY OF AMERICAN PLUMS.

The history of American plums, so far as Europeans are concerned, probably begins with the visit of John de Verrazano, a Florentine voyager, who sailed from the vicinity of Madeira on January 17, 1524, under orders from the French king, Francis I. He reached America at about latitude 34° north, and proceeded northward along the coast to latitude 50°, when he departed for France. The explorer's account of his voyage is dated at Dieppe, July 8, 1524, and in his enumeration of American products observed at about 41° north, or the latitude of southern New York, he states (29, p. 362):[1] "We found Pomi appii, damson trees, and nut trees." The voyagers apparently nowhere went far inland, and the "damson trees" were with little doubt *Prunus maritima*, since this is the only species in

[1] Reference is made by number to "Literature cited," p. 73.

that region having foliage at all comparable with that of the damson plum. The fruit could not have been much more than formed at the time and, in fact, no mention is made of it.

A few years later, in 1534, Jacques Cartier (43, p. 17; 68, p. 31) observed some time during the month of July what was probably the fruit of *Prunus nigra*. "They have also plums, which they dry as we do for the winter; they call them Honesta." The fruit even of this species must have been brought some distance, for it is not known to occur far below the vicinity of Montreal, and no other in that region has fruit large enough to be dried in the manner described. On his second voyage (43, p. 35), plums were again observed by Cartier in the vicinity of an island which the explorers named Isle de Bacchus, and which is now known as the Isle of Orleans.

The account of Roberval's voyage (29, p. 294) in 1542 also mentions plums, as follows:

> And in all these Countreys there are okes, and bortz, ashes, elmes, arables, trees of life, pines, prussetrees, ceders, great wall nut trees, and wilde nuts, hasel-trees, wilde peare trees, wilde grapes, and there have bene found redde plummes.

Another explorer, De Soto (16, p. 43, 61), landed in Florida on May 30, 1539, and the narrator relates that on October 27 they came to Anaica Apalache, which was probably not far from the present site of Tallahassee, Fla., and says:

> There were other towns, where was great store of maiz, pompions, french beanes, and plummes of the countrie, which are better than those of Spaine, and they grow in the fields without planting. * * * There met him on the way [to Canasagua] twenty Indians, every one loaden with a basket ful of mulberries: for there be many, and those very good, from Cutifa-Chiqui thither, and so forward in other provinces, and also nuts and plummes. And the trees grow in the fields without planting or dressing them, and are as big and as rancke as though they grew in gardens digged and watered.

The first-mentioned trees, those seen in the autumn of 1539, may have been *Prunus americana*, since that species occurs in the locality specified, and in that section is the latest one to ripen its fruit. The second reference is perhaps to *P. angustifolia*, as the fruit ripens at the time mentioned, which was about the first of June, 1540. At Coça, or Coosa, about July 26, 1540, the author writes (16, p. 68):

> There were in the fields many plum trees, as well as of such as grow in Spaine, as of the countrie * * *.

Cutifa-Chiqua appears to have been on the Savannah River below Augusta, Canasagua on the northern boundary of Georgia, and Coosa is supposed to be the locality now represented by Old Coosa on the Coosa River, in Georgia.

Plums are again mentioned as having been observed, probably in June, 1541, at the Indian town "Casqui" (16, p. 94). This locality was west of the Mississippi, but commentators differ as to its location.

Monette (56, p. 48) places it on the White River, about 150 miles above its junction with the Mississippi, McCulloh (48, p. 526), on the Red River beyond the "Wachita." It was evidently the custom of the Indians of the Southwest to dry fruit for use at other times than when it could be gathered fresh from the tree, for De Soto's narrator says (16, p. 119):

> For when they came downe from Nicola, they saw on the other side of the river new cabins made. John Danusco went and brought the canoes loden with maiz, French beanes, prunes, and many loaves made of the substance of prunes.

This is supposed to relate to a locality on the Mississippi not far from the mouth of the Arkansas, and to have been in the latter part of April, 1542.

Plums are mentioned by Réné Laudonniere (29, p. 369) in "The Description of Florida," 1565; by William Strachey in Virginia, writing about 1610; by Francis Higginson, in "New England's Plantation," 1630; by William Wood, in "New England's Prospect," 1635; and by a number of others (5, p. 170–173).

A little less than a century after the above-named authors gave their accounts, John Lawson (41) gave a much better description of native fruits, as follows:

> The wild Plums of America are of several sorts. Those which I can give account of from my own knowledge, I will, and leave the others till a farther discovery. The most frequent is that which we call the common Indian Plum, of which there are two sorts, if not more. One of them is ripe much sooner than the other, and differs in the bark; one of the barks being very scaly, like our American Birch. These trees, when in blossom, smell as sweet as any jessamine, and look as white as a sheet, being something prickly. You may make it grow to what shape you please; they are very ornamental about a house, and make a wonderful fine shew at a distance, in the spring, because of their white livery. Their fruit is red, and very palatable to the sick. They are of a quick growth, and will bear from the stone in five years, on their stock. The English, large black plum thrives well, as does the cherry being grafted thereon.
>
> The American damsons are both black and white and about the bigness of an European damson. They grow anywhere if planted from the stone or slip; bear a white blossom, and are a good fruit. * * * I have planted several in my orchard, that came from the stone, which thrive well amongst the rest of my trees, but they never grow to the bigness of the other trees now spoken of. These are plentiful bearers.
>
> There is a third sort of plum about the bigness of the damsons. The tree is taller, seldom exceeding ten inches in thickness. The plum seems to taste physically, yet I never found any operation it had, except to make their lips sore, that eat them. The wood is sometimes porous, but exceeds any box, for a beautiful yellow.

The native plums were observed by John Bartram (7, p. 19) on his journey from Pennsylvania to central New York in 1751.

> Our way from hence lay through an old Indian field of excellent soil where there had been a town, the principal footsteps of which are peach trees, plumbs, and excellent grapes.

Plums were not infrequently found by early voyagers about Indian villages, and in some instances they may have been planted

and rudely cared for. The manuscript account by Conover (31, p. 58) of Sullivan's expedition indicates that when the village of Kanadasaga was destroyed, orchards of apples and plums were found crudely cultivated. William Bartram (8, p. 38) also refers to the cultivation of plums, although in a less convincing manner, as follows:

> I observed, in the ancient cultivated fields, 1. diospyros, 2. gleditsia triacanthos, 3. prunus chicasaw, 4. callicarpa, 5. morus rubra, 6. juglans exaltata, 7. juglans nigra, which inform us, that these trees were cultivated by the ancients, on account of their fruit, as being wholesome and nourishing food.

These observations seem to have been made in the vicinity of Wrightsboro, eastern Georgia.

Again, in northwestern South Carolina, not far from Keowee (8, p. 331), "appeared the remains of a town of the ancients, as the tumuli, terraces, posts or pillars, old Peach and Plumb orchards, &c., sufficiently testify."

At the ancient town of Sticoe (8, p. 343), Bartram again says, "here were also old peach and plum orchards; some of the trees appeared yet thriving and fruitful."

In all these instances in which plums are mentioned as being found in orchards, they were either with trees introduced by Europeans or were near settlements of Europeans. Earlier authors appear to have found groves of plums about Indian villages, but say nothing to indicate that the trees or seeds were intentionally planted or cared for, and perhaps this was not done until the coming of the white man. The Indian villages may have been established in proximity to plum groves, or these may have sprung from seed thrown away after the fruit had been brought for use from other localities.

EARLY BOTANICAL DESCRIPTIONS.

The first species to receive a botanical description was probably *Prunus americana*, for it is apparently this species which Plukenet (61, p. 306) describes as "Prunus sylvestris Virginiana fructu luteo rubente rotundo, ossiculo lato & compresso," and which he figures in his Phytographia, tome 216, as figure 7. The leaves are figured with acute serrations and are about the form of those of *Prunus americana*, while the description of the fruit and stone also accords well enough with this species.

In 1739, a little more than 40 years afterwards, two species were included in Clayton's Flora Virginica (28, p. 54), "Prunus sylvestris humilior, fructu rubro praecociori & minori, radice reptatrice," and "Prunus sylvestris, fructu majore rubente." Although Linnæus is credited with the authorship of Clayton's Flora, these species are not included in the Species Plantarum. It is difficult to say whether Clayton's descriptions really represent more than one species or,

if only one, whether it is *Prunus angustifolia* or *P. americana*. Thomas Jefferson (34, p. 63) identified "Prunus sylvestris fructu majori" as the "Cherokee plumb," and "Prunus sylvestris fructu minori" as the "Wild plumb" (*Prunus americana*).

The next species to receive attention by a botanist was *Prunus pumila*, which had been introduced into the gardens of France and was described by Duhamel (19, p. 149) about 1755, as follows:

Cerasus pumila, Canadensis oblongo angusto folio, fructu parvo, Cerisier nain à feuilles de Saule. Ragouminer, ou Nega, ou Minel de Canada.

Prunus pumila was the first to be given a binomial name, which distinction it received in 1767.

Humphrey Marshall (51, p. 110–114), who was the first author to treat any considerable number of species, described the following:

Prunus americana, "Large yellow sweet plumb"; *P. angustifolia*, "Chicasaw plumb"; *P. mississippi*, "Crimson plumb"; *P. maritima*, "Seaside plumb"; *P. declinata*, "Dwarf plumb"; and "*Prunus-Cerasus montana*, Mountain Bird-Cherry-Tree."

One of Marshall's species, *P. mississippi*, is not identifiable; the descriptions of the others are characteristic, however, and they are still recognized as distinct species, although some of them had been earlier described. A few of the species now known were unrecognized until recently, and perhaps others yet remain to be distinguished.

HORTICULTURAL HISTORY AND DEVELOPMENT.

Turning now to the recognition and development of native plums by pomologists, it is found that they were at first slow to recognize the value and distinctness of the American species, although in later years they have been almost the only ones who have studied the genus critically.

The earliest works devoted to fruits and fruit growing in America do not appear to make any reference to the native species, the first accessible reference being by Bernard M'Mahon (50, p. 588), who, in 1806, at the end of a list of plum varieties lists "Chicasaw, *Prunus chicasa*," but gives no description or note concerning the species. Another author, William Coxe (15, p. 232), writing in 1817, says that plums are—

Natives of the United States, in many parts of which they are found in great abundance, in numerous varieties of Colour, form and size, many of them in good flavour.

According to the same author, who lists 18 varieties, those cultivated in the gardens were either brought from Europe or produced from the stones of imported plums.

A few years later James Thacher (70, p. 223) says:

It is a fortunate circumstance that there are, according to Mr. Prince, of Long-Island, some kinds of plum not subject to the attack of the insect [the curculio] which are the

following: Chicasaw, Early Coral, Golden Drop, The Cherry plum, Flushing Gage, Yellow Egg plum, Balmer's Washington * * *.

The "Chicasaw" is the only one of these varieties that can be recognized as a native, and Thacher is perhaps the second author to refer in an American horticultural work specifically to a native, although the name "Chicasaw" may have appeared before in one of William Prince's catalogues, as well as in M'Mahon's work. Prince (63, p. 22), in 1828, mentions but does not describe the "Yellow and Red Chicasaw," and "American Red and Yellow," these being presumably *Prunus angustifolia* and *P. americana*. Three years later the same author (64, p. 104, 108) described "Red Chicasaw Pr. Cat. *Prunus chicasaw* Mich." as follows:

This fruit is nearly round and of good size; the skin is of a fine cherry colour; the flesh yellowish, soft and melting when at full maturity, with a pleasant and peculiar flavor. This plum ripens from the 20th to the end of July. The tree is naturally low set and bushy, being inclined to spread its branches but a short distance from the ground. It also throws out short spurs, with leaves on them, each of which is terminated by a sharp-pointed thorn. Numerous suckers spring up from the root and serve as a means of propagation; but the trees which are inoculated on other stocks attain the handsomest form and make far the best appearance, and they have also the advantage of not generating suckers to the same extent. There is another variety which produces yellow fruit, but it differs only in respect to colour.

Prince also describes the Beach plum, and says:

The fruit is globular, often an inch in diameter, of a purple colour, with a glaucous bloom; it is pleasant for eating, and in flavour similar to the common plum.

This may seem rather extravagant praise of the Beach plum, yet there can be no doubt of the species, for he says:

Its natural location is near the salt water, along the coast and on islands. The fruit ripens in August and September. Gen. Dearborn, the enlightened and distinguished president of the Massachusetts Horticultural Society, has himself discovered several varieties of it growing in a wild state, two of which are purple, but vary in respect to size, and a third of a shining crimson colour; and it is to his liberality that I am indebted for the trees in my collection.

Prince does not describe *Prunus americana* in his Pomological Manual.

A native species is mentioned again in 1833 by William Kenrick (37, p. 256), a nurseryman at Newton, Mass., who includes presumably *Prunus nigra* under the name "Canada Plum." Kenrick says:

The tree is of medium vigor, diffuse in its growth; fruit small, oval, fiery red; flesh coarse grained and sour; juice abundant and aromatic. It is supposed to possess medicinal qualities.

This species is omitted by Kenrick in the edition of his work published in 1835, but it is referred to briefly by Fessenden (24, p. 246), who says:

A wild kind, found in the woods of Vermont, grows large and fair, but its fruit contains little saccharine matter. No doubt it might be improved by culture, and may furnish stocks for grafting.

Kenrick again refers to a native in 1841 (38, p. 230), when he describes the "Dwarf Texas Plum" as follows:

A low, dwarfish tree or shrub, rising 2 or 3 feet or more; the blossoms white, profuse, of a beautiful appearance, and in early spring resembling snow; the fruit of different colors, according to the variety, some being yellow, some red, and some purple; the flesh of delicious flavor; the produce most abundant. This new tree, or shrub, was lately introduced to our country from a small district in the colder part of Texas, and the upper Colorado, by my friend John B. Russell, Esq., of Cincinnati, Ohio. He is persuaded it must prove hardy.

This description suggests very strongly *Prunus angustifolia watsoni*, but possibly might also refer to *P. reverchonii*. It is almost certainly one or the other of these two. If it is really the sand plum, it is a little curious that it should apparently not again come to the attention of horticulturists until about 1890. It was, however, grown in gardens to some extent in Kansas and probably also in Nebraska, as early as 1880, or perhaps even earlier.

Thomas Bridgeman (11, p. 339) in 1840 and Michael Floyd (42, p. 303) in 1846 also mention native species and discuss them briefly, and an early edition of Thomas's American Fruit Culturist includes the "Red Chicasaw (*Prunus chicasa*)" (71, p. 347–348), which the author describes and says is "a native of the western states." Thomas is evidently more familiar with *P. americana*, concerning which he says:

There are many wild varieties of this species, the fruit varying from roundish to oval, and presenting various shades of color, mostly light red. Some have a pleasant, rich, sweet or subacid pulp. Tree 10 to 15 feet high, leaves ovate, coarsely serrate, branches somewhat thorny. Ripens latter part of summer. The quality of the fruit is improved by cultivation. It is sometimes used as stocks for the plum and apricot.

Thomas also describes the beach plum rather briefly and mentions these natives in some of the later editions of his work, but in that of 1867 all reference to them is omitted. Native plums were discussed by Elliott in 1854 (21, p. 402), who said *Prunus americana* was much used by nurserymen as a stock, seedlings of it often answering to work the same season. Elliott also throws some light on the attention that had been given at that time to the development of new varieties in general, in the following statement:

New varieties have thus far been produced from chance seedlings; no persons, to our knowledge, in this country, having exerted themselves to the production of varieties with any special view to the preservation of separate or combined characters.

Elliott lists the beach plum among his varieties, but says it should be discarded. This author in a later work (23, p. 95) discusses the native varieties a little more fully, and what he says concerning them indicates a more thorough knowledge of their merits and adaptability than is shown by almost any other author of a pomological work up to that time. Elliott's book is also one of the earliest general works to give a list of the native varieties known. The author says:

There are besides the cultivated varieties, known botanically as *Prunus domestica*, many others, native of our own country. They are known under various botanical terms, *Prunus Chicasa*, *Prunus Americana*, *Prunus Maratima* [*maritima*], and in general terms called *Chicasaw*, to the latter of which belong the varieties called *Wild Goose*, *Newman*, *Mountain Plum*, *Indian Chief*, one of the *Chicasa* family. The North and the South can depend for hardiness only upon what we call native varieties. Vermont can do little with our cultivated varieties, except in certain localities, and so with all the extreme North; while the records from South Carolina, Georgia, Tennessee, etc., give place only to our native wild varieties. Ohio and westward had originally many varieties of wild Plums, from round to oval, color from dark purple to red and yellow, time of maturity from September to midwinter, if the latter were not gathered. The trade in these native wild plums was at one time a large source of profit, but the clearing up of the country has destroyed them as it has blackberries.

Writing a little earlier than the publication of this later work of Elliott, D. W. Beadle (10, p. 118) evidently considers that there are possibilities in the species native to Canada, for he says:

Wild Plums are found growing in all parts of the Dominion, and may by judicious cross-fertilization become the foundation of a very hardy and valuable race of Plums.

Returning to an earlier work, one might expect in so comprehensive a publication as "The Fruits and Fruit Trees of America," by A. J. Downing (18, p. 263), to find the native species treated more fully than by most other authors. The whole discussion, however, is given in a footnote, in which the author says:

There are three species of wild plum indigenous to this country of tolerable flavor, but seldom cultivated in our gardens.

This is followed by descriptions of the three species *Prunus chicasa* [angustifolia], *P. americana*, and *P. maritima*. Downing refers the "Dwarf Texas Plum" of Kenrick to *P. angustifolia*. The edition of this work issued in 1890 still contains the statement originally made concerning the native species.

Barry (6, p. 120–121), in 1852, treats of the American species in the following brief manner:

The *Canada* or *Wild Plum*, which abounds in Ohio, Michigan, and other Western States, are distinct species, and reproduce themselves from seed. The seedlings of some grow extremely rapid, making fine stocks in one year on any good soil, * * * and we have no doubt some native species, as for instance the *Beach* and *Chicasaw* plums, small trees, will make good dwarf stocks. I am inclined to think, however, that very nice garden trees may be raised on the smaller species of the Canada plum. The first year's growth and even the second are quite vigorous on them, but after that the vigor diminishes, and the trees become quite prolific. This and the cherry plum will probably become our principal stocks for dwarfing.

Perhaps the earliest pomological work in which varieties originating from native species are described is that of S. W. Peek (60, p. 186), published in 1885. The author of this work was the proprietor of the Hartwell Nurseries, at Hartwell, Ga., and doubtless his southern location accounts for his interest in these varieties, which are, with two exceptions, of southern origin. The varieties described are the

Bassett, Cumberland, Marianna, Miner, Newman, Weaver, and Wild Goose.

Only a few years later Eliphas Cope (14, p. 8) published at New Lisbon, now simply Lisbon, in eastern Ohio, a pamphlet of 45 pages devoted entirely to plums, but here again the native varieties are dismissed with a single paragraph:

> The native plums should not be planted but sparingly, only when they have been tried and given satisfaction. North of 40° latitude we question if they will give satisfaction or remuneration for labor.

The author of this statement must have been quite unfamiliar with the development and utilization of the native species taking place at that time in the States of Illinois, Wisconsin, Iowa, and Minnesota, where they were rapidly becoming of great importance.

The brief discussions of the native species by the authors quoted above show that after two centuries of occupation by Europeans the native species held a relatively very unimportant place in American pomology. In 1850, a few years earlier and later, respectively, than the publications of Barry and Downing, the center of population in the United States was near Parkersburg, W. Va. The people of the Southern States were little engaged in fruit raising, and the industry was therefore mainly confined to the States east of the Great Lakes and north of the Ohio and Potomac Rivers, a region in the greater part of which the varieties of *domestica* and *insititia* origin are grown with success. As the population of the country increased and spread westward beyond the region in which European varieties of plums were successfully grown, attention began to be directed more and more toward the utilization of native species, and this interest was accelerated by reason of the ravages of the curculio and the belief of many people that native plums were less affected by the insect.

The first efforts at plum culture, however, even in the States of Illinois, Wisconsin, and Iowa were mainly with those varieties of the Old World species that had been known in the Eastern States. Failing with these, the attention of fruit growers was of necessity turned to the native varieties, and a few were quite optimistic as to the outcome. Among these was J. S. Stickney (69), of Wauwatosa, Wis., who, in an address before the Iowa Horticultural Society in 1877, said:

> I am dreaming that among these [native plums] there is something valuable; their endurance, productiveness, and perfect hardiness should and *must* be made useful to us, and we have no right to rest or flag in our efforts until we have an orchard of native plums that shall command in market two to four dollars per bushel, and yield crops as abundant and frequent as the wild ones in our thickets now do. About the possibility of this there is very little doubt * * *.

A little later D. B. Wier, a prominent horticulturist at Lacon, Ill., grew all the native varieties he could secure, while in Iowa, J. L. Budd, Capt. Watrous, and others very early recognized the value of

the native plums and contributed in a marked degree to their introduction and development. At this time, however, the native species were poorly understood, some of them were undescribed, and information concerning their hardiness and adaptability to certain regions could be had only by growing them. Although the need of some scientific basis for the classification of varieties was recognized, it was not until 1892 that anything of the kind was seriously attempted, and perhaps no other single event so stimulated and influenced the culture of the varieties of the native species as the publication by L. H. Bailey (2) of "The Cultivated Native Plums and Cherries," which was the first real scientific work on these fruits to appear in many years. Horticulturists in other agricultural experiment stations, following the passage of the Hatch Act, also became active in testing and to some extent in breeding varieties, so that in the years from 1888 to 1900 there appeared more than 70 bulletins devoted wholly or in part to this subject.

Having followed the development and utilization of the native species throughout the greater part of the last century, as shown in the general works on the culture of fruit in America, it is of interest to turn to the development of horticultural varieties from these species. The history of this development is to be found mainly in the proceedings of horticultural societies, in horticultural and agricultural journals and papers, and sometimes even in nursery catalogues. Many able and enthusiastic horticulturists have been concerned in this development, and among those who took a prominent part in this important work in Minnesota were O. M. Lord, J. S. Harris, H. Knudson, Peter Gideon, Martin Penning, Charles Luedloff, and C. W. H. Heideman. In Iowa, H. A. Terry began to grow the native plums more than 40 years ago, and he has originated more varieties than any other individual. Edson Gaylord and, more recently, N. K. Fluke have been prominent in the introduction of varieties, while C. G. Patten has originated a few and tested many more. Theodore Williams was for many years active in Nebraska, and N. E. Hansen is at the present time doing an important work in South Dakota.

While this work in amelioration was going on in the West, J. W. Kerr, on the Eastern Shore of Maryland, had been making a specialty of native plums since 1872, and had found among them the most profitable varieties he could grow. Farther south, J. S. Breece, of North Carolina, within the last few years has introduced a number of varieties, these being mainly hybrids with the Japanese plums. Horticulturists in Texas also early began to turn their attention to the native species, and Gilbert Onderdonk, T. V. Munson, and A. M. Ramsey have each introduced a number of varieties, while

more recently F. T. Ramsey, A. L. Bruce, and D. H. Watson have originated a number.

Many other growers have cultivated and originated new varieties, but the names here mentioned will serve to indicate where the greatest activity has been and what influences have aided this development. The contribution that each of these men has made toward the utilization of the native species is not, however, to be measured merely by the number of varieties that have been introduced, for an equal or sometimes greater service has been rendered by growing the untried varieties and freely making known the results of this experience before horticultural societies and elsewhere.

It would probably be very difficult to tell when the first recognized horticultural variety of native origin received a name, but excluding such terms as "Red and Yellow Chickasaw," "Red and Yellow American," and "Beach Plum," which are group names and can scarcely be considered as horticultural varieties in the same sense as the Weaver, De Soto, Miner, and Wild Goose, the first variety to receive this distinction was apparently the Miner. This variety was first known by other names, and the use of the name Miner may have been no earlier than the application of other names to other varieties of about the same period. This event is of so much importance in the development of American plum varieties that it deserves as complete a history as may be given, and of the several accounts, differing in details and even sometimes in essential facts, the following one by Mr. Giddings (26, p. 332) is generally credited as being authentic:

The Miner plum.—I have been kindly asked by a number of members of this society to write the history of the Miner plum. There is no fruit that has been talked of more of late at the West and of which so little is really known as the Miner or Hinckley plum. Its origin having become a mooted question, I will endeavor to give you a true history. I know that Charles Downing gave credit to Mr. Miner for originating it; but let us give credit to whom credit is due. This plum has been traced into Mr. Hinckley's hands several times by different parties, but no further. It is thought he bought it of a tree peddler, and perhaps he did, but I am now inclined to think he *did not*. At any rate, if Mr. Hinckley bought it of a peddler, he was not the first man who brought it to Galena. Though not known to have been cultivated in any nursery, it is now known to have been disseminated by sprouts among the farmers for more than 50 years in the State of Illinois; and Mr. Hinckley's peddler could easily have picked it up at some farmer's house. We here give the true history: In 1813 one Wm. Dodd, then an officer under Gen. Jackson, found this plum growing among the Chickasaw Indians at the horseshoe bend on the Talaposa creek. His attention was called to it by the beauty, size, and excellence of quality of the fruit. In the year 1814 he brought the seeds of this plum with other valuable fruits collected by a friendly Chickasaw Indian chief to Knox county, Tenn. Here he planted his seed and raised the first trees. In Knox county, Tenn., they went by the names of "Old Hickory" and Gen. Jackson. About the year 1823 or 1824 Wm. Dodd moved to Illinois and settled near Springfield. He brought with him some sprouts

of "Old Hickory" plums. He planted these in some newly broken sod, and they did not do so well. Having left a brother in Knox county, Tenn., to come to Illinois the next spring, he wrote to him to bring more sprouts of the noted "Old Hickory." His brother left Tennessee the spring of 1824–5, and instead of going to Sangamon county he went to Galena, taking with him a bundle of the plum sprouts intended for his brother. Finding himself so far from his brother, the sprouts were given away or sold, and for aught I know Mr. Hinckley may have received some or all of them. Anyhow it can be abundantly proved this is how this now noted plum first came to Galena.

Some of Wm. Dodd's trees in Sangamon county finally got to growing, fruiting, and sprouting, and they were distributed to some extent among his neighbors, but not, so far as known, among nurserymen. In Sangamon county the plum was called "Wm. Dodd" and "Chickasaw Chief." Some time after moving to Illinois Mr. Dodd, hearing of some very fine plums near Galena, sent for some cions, and behold he got the identical Wm. Dodd plum. Upon putting this and that together, of course Mr. Dodd felt satisfied that the famous plums at Galena had sprung from the sprouts taken there by his brother in 1824 or 1825.

In those early days no one disputed the fact that Mr. Dodd really brought this plum from Tennessee. If any more special proofs are wanted for the facts (for facts they are) we have given, it can be gained by applying to Wm. Dodd's grandson, living at Flint, Mahaska county, Iowa, or his mother's sister—now over 70 years of age—near Springfield, Ill.

Another account by H. H. McAfee (44, 45, 46), a resident of Freeport, Ill., and later of the University Farm, Madison, Wis., differs somewhat from that given by Mr. Giddings. Mr. McAfee says the plum was known under various names, "Miner, Townsend, Isbell, Peach, Chickasaw, etc.," and relates its history as follows:

In 1832, a man named Knight brought from southern Ohio, by boat to Galena, a stock of small trees, which he disposed of to the late Major Hinckley and others. The trees planted by Major Hinckley are still in full vigor, and bearing, and may be seen at his old place near Galena. The year following the first importation, Knight brought a second lot of trees, and planted most of them on Mr. George Townsend's farm, in the eastern part of Joe Daviess county. From these stocks the most if not all of the trees disseminated under the various names mentioned above have sprung; and as Major Hinckley was largely instrumental in securing the general planting of the plum, generously giving them away to his neighbors and friends, and as he grew them first in the west, it was decided by that society [Northern Illinois Horticultural Society] that the name "Hinckley" could with more propriety than any other be applied to all these plums springing from Knight's importation, except the seedlings. The name "Miner," applied by Mr. Barber at a late date in honor of the man from whom he derived his trees, is not defensible on any rules of pomological nomenclature; and the other names mentioned above are in a like manner objectionable.

It appears from a later account (47) that trees were disseminated by Maj. Hinckley, and the variety came into the possession of a Mr. Townsend, who grew the trees in a nursery for sale. From this circumstance the variety was often known as the "Townsend." A relative of Mr. Townsend took some of these trees to Lancaster, Wis., and from this stock trees were grown by Joel Barber, who gave

them the name of Miner, in honor of his father-in-law, Mr. Miner. D. L. Adair (1, p. 145), of Hawesville, Ky., says:

> This plum received its name from a Mr. Miner of Grant County, Wis., who took the trees there from Illinois.

Whether Maj. Hinckley really obtained his trees from the brother of William Dodd, who went to Galena, or from Mr. Knight, can scarcely be determined with certainty from the conflicting statements that have been published. Possibly both accounts are substantially correct and the variety was taken into Illinois, first from Tennessee and a few years later from Ohio. Both accounts agree as to the possession of the trees by Maj. Hinckley. There can also be little doubt of how the name Miner came to be applied, and as early as 1869 the variety was widely known by that name.

The first mention of the name Miner in a publication is apparently in the April number of the American Agriculturist, in 1867 (54), where information concerning it is requested. This notice brought a reply printed in the July number from N. C. Goldsmith, Middletown, N. Y., which would indicate that the variety was quite widely disseminated under the name Miner even at that time. A year later, in the February number of the same paper, "W. W." (73), Grant County, Wis., says:

> I have raised the Miner plum for five or six years; I got it from Mr. Miner, in Grant Co., Wis., who bought his trees of a man in Illinois, who did not have any name for them, so they were called the Miner plum. The true name is Chickasaw plum. A Mr. Isabell, of Joe Davis Co., Ill., has raised the same plum for more than twenty years.

Grant County is in the extreme southwestern part of Wisconsin and joins on the north Jo Daviess, the county in which Galena is situated, where the Miner was supposed to have been taken in 1824 or 1825. The reference by Downing to Mr. Miner, of Lancaster, Pa., is undoubtedly an error for Lancaster, Wis.

This Mr. Miner seems to have desired to assume the credit for having originated the variety, according to the account written by Joseph L. Budd (12), who says:

> A certain Mr. Miner brought this plum to Lancaster, Wisconsin, some sixteen years since, with the statement that it was produced from pits planted by him of the Yellow Egg or Magnum Bonum Plum [a variety of European origin] a number of years previous, and that it had been disseminated alone from the sprouts taken from the original seedling tree as planted by him.

The variety is figured and described in the November number of the Horticulturist (55), in 1867, but it is preceded in point of description by the Newman variety, described but not figured in the September number of the same journal (22). This note in the September number, from Mr. Elliott, of Cleveland, Ohio, is of interest in connec-

tion with the natural distribution of *Prunus munsoniana*, to which the Newman belongs. Mr. Elliott says:

> In my earlier days I frequently met with wild plums in Ohio and have often done so in Missouri, that were almost if not quite identical, and in the years 1836 to 1845, or thereabouts, they were abundant in the markets of all the western towns and cities.

The variety Newman is again described and figured by D. L. Adair (1, p. 142), from whom Mr. Elliott received his specimens, but the origin of the variety is not given. Mr. Adair was evidently somewhat of an enthusiast in the development of native fruits and apparently enumerated all of the varieties of native plums known to him. These were the Newman, Langsdon, Miner, Muldraughs Hill, and Wild Goose. The Langsdon, as described and figured, appears to be *Prunus hortulana*. The Muldraughs Hill is said to have been found wild on Muldraughs Hill, Hardin County, Ky., and is evidently *P. americana*, probably being the first-named variety belonging to that species. It has apparently not been grown to any extent, at least not under that name. The Wild Goose, the first representative of the second species to become prominent horticulturally, is perhaps the most widely disseminated and best known of any variety of the native species. The history of its origin is given by Miller (52; 53), as follows:

> This invaluable fruit was first made known to the public about twenty years ago by Capt. Means, of Middle Tennessee, who, having killed a wild goose, discovered a plum seed in it, which he planted, out of curiosity. It grew rapidly, and fruited the third year; and being convinced of its superior qualities, he made it known to various nurserymen, who, from this same, propagated all the genuine Wild Goose plums that are now so deservedly popular wherever known. This plum is undoubtedly a seedling of the Chickasaw, but so much superior to it in size, quality, firmness, adaptability to shipping long distances, and its immense productiveness, as well as its early bearing, rapid growth and long duration, as to fully entitle it to a distinct appellation.

In the later account this writer says that the gentleman who first made it known lived in the vicinity of Nashville, and that until within a few years it had been controlled by a few propagators, but that it was then becoming known generally throughout the Mississippi Valley and in some of the Western States. An orchard of this variety in southwestern Tennessee was then 15 years old.

The history of the origin of the Wild Goose plum is also given by J. S. Downer (17, p. 116) and by L. H. Bailey (5, p. 176), who gives substantially the same account as that given by Mr. Downer. There was evidently, as in the case of the Miner, a disposition to give the credit of the discovery of this variety to more than one individual, for in the American Horticultural Annual of 1870 (62), among the varieties of the previous year, the following statement is made:

> Specimens of the Wild Goose plum were sent us by Mr. Samuel A. Barber, of Madison, Tenn., who claims that the original tree "was raised by M. E. McCance, my father-in-law, from seed taken from a wild goose's craw."

Mr. Barber does not state where his father-in-law lived, while Mr. Downer's account places the original tree in the neighborhood of Columbia, Tenn., and states that at about 1850, the time when James Harvey, of Columbia, gave him an account of the origin of the plum, there were no conflicting statements in regard to it. The attempt was made to propagate this plum from seed as well as by budding, and this resulted in considerable diversity in the variety grown as Wild Goose and differences of opinion concerning it. Some of these seedlings received local names, as the Nolan, Hog, Goose Egg, Tennessee, and King of Plums. The Wild Goose was introduced into Iowa before 1871 by H. A. Terry, who obtained it from W. S. Rainey, of Columbia, Tenn. It was also offered in 1871 by William Parry, of Cinnaminson, N. J., and this date evidently marks the beginning of its wide dissemination.

Another event of particular importance in the development of fruits for the northern Mississippi Valley and the eastern Plains region was the introduction of the De Soto plum, this being apparently the first variety of *Prunus americana* to be extensively propagated and to attract attention to the horticultural development of this species. The history of this variety is given by C. G. Patten (59, p. 237), of Charles City, Iowa. The first settler on the land where this plum was found at De Soto, Wis., was an American by the name of Tupper, who located there in 1853 or 1854. The original settler sold the farm in 1855 to the Trayer brothers, who were Frenchmen. There were at this time three or four groves of wild plums on the farm, and these the new owners destroyed, with the exception of the one later known as Trayer De Soto and De Soto, which produced such superior fruit that it was preserved. The next possessor of the farm was a Mr. Steven Heal. At some time a small orchard must have been planted on the place with trees from this original wild grove, for such an orchard was described as consisting in 1881 of 60 trees, the largest having a trunk diameter of about 10 inches. The variety began to be propagated and disseminated about 1864 by a Mr. Hale, who lived at Lansing, Iowa, only a few miles from De Soto.

The Bixby (72, p. 434), another *americana* plum, may be even older than the De Soto, but it seems to have been less widely grown. This variety was named for "Father Bixby," who settled in Clayton County, Iowa, in 1847, and on whose place the plum was then growing. Forty years later the trees were still thriving. These varieties were the beginning, the first developments, in a species that before the close of the century was to furnish more varieties than any other native.

While the first name for a native plum that may be termed varietal in the pomological sense seems to have been published in 1867, there have now been applied, either to varieties of the native species or to

their hybrids, more than 800 names, a development that has taken place in less than 50 years. During the decade from 1890 to 1900 the increase in the number of varieties was exceptionally marked. Many of these differ very little from each other and often are little or no better, doubtless in some cases not so good, as those which may still be found in a wild state. During the last decade there has been perhaps less interest, and probably only about 70 varieties of natives or their hybrids were offered by the nursery trade in 1911. Too many varieties have been produced without sufficient knowledge of the distinguishing characters of the species or of their relationships, and a reaction has inevitably followed the feverish dissemination of new varieties. In the beginning of horticultural development this is perhaps unavoidable. Much pioneer work has to be done before a basis for scientific development can be obtained, and now, after 50 years of work, the real substantial improvement remains to be accomplished.

SYSTEMATIC BOTANY.

The botanical treatment given the species in the following pages may perhaps be considered a broad one. There will always be differences of opinion as to what constitutes a species, and the study of a small amount of material which did not show the gradual variation from the aspect assumed by a species in one part of its range to that assumed in another part might have led to different conclusions. Fortunately, a large amount of material has been available. Further study of the species in the field will continue to afford interesting results concerning their variations and relationships, particularly in the Southern and Southwestern States. Many of the species extend over a considerable range of territory. Most of them are variable, but these variations have been very carefully considered, and it is believed that to have established species on the slight differences that have sometimes served as the basis for proposed species when a small amount of material was available would mean the description of hundreds of forms—they can not be termed species—and there would still remain hundreds of others intermediate in character.

The present treatment has been based on a study of nearly all the species in the field, of more than 400 horticultural varieties, and of the collections of the Bureau of Plant Industry, the United States National Herbarium, the Arnold Arboretum, the Gray Herbarium of Harvard University, the New York Botanical Garden, the Missouri Botanical Garden, the Herbarium of the Geological and Natural History Survey of Canada, the New York State (Geneva) Agricultural Experiment Station, Cornell University Agricultural Experiment Sta-

tion, the Academy of Natural Sciences of Philadelphia, the Milwaukee Public Museum, the University of Wisconsin, the University of Minnesota, the Kansas Agricultural College, the Michigan Agricultural College, the Northwestern University, the Chicago Academy of Sciences, the Leland Stanford Jr. University, the University of California, and the Field Museum.

SYNOPSIS OF THE SPECIES.

PLUMS.

Americana group:
- Prunus nigra.
  - americana.
  - mexicana.

Subcordata group:
- Prunus subcordata.
  - subcordata oregana.

Hortulana group:
- Prunus hortulana.
  - hortulana mineri.
  - reverchonii.
  - rivularis.

Angustifolia group:
- Prunus munsoniana.
  - orthosepala.
  - angustifolia.
  - angustifolia watsoni.
  - angustifolia varians.

Maritima group:
- Prunus alleghaniensis.
  - alleghaniensis davisii.

PLUMS—continued.

Maritima group—Continued.
- Prunus umbellata.
  - umbellata injucunda.
  - umbellata tarda.
  - gravesii.
  - maritima.

Gracilis group:
- Prunus gracilis.
  - venulosa.

CHERRIES.

- Prunus pennsylvanica.
  - pennsylvanica corymbulosa.
  - emarginata.
  - emarginata villosa.

DWARF CHERRIES.

- Prunus pumila.
  - cuneata.
  - besseyi.

KEY TO THE SPECIES.[1]

1. Leaves various in form, the serrations extending practically to the base, somewhat pale below or green on both surfaces. *Flowers with the calyx more or less pubescent,* except in *Prunus nigra (northern species with large flowers and reddish calyx) and in species with more or less corymbose inflorescence* ..... 2.
1. Leaves obovate-spatulate or sometimes lance-oval on succulent shoots, entire toward the base and pale below with a glaucouslike color. *Flowers in umbellike clusters, the calyx lobes small, obtuse, and glabrous* ..... 19.
2. Leaves usually with at least the petiole finely pubescent along the upper edge or a few scattered hairs along the midrib below or with small tufts in the axils of the lateral veins. *Inflorescence umbellike;* fruit 12 to 35 mm. in diameter, usually with more or less bloom, flesh edible ..... 3.
2. Leaves glabrous even to the petiole, or pubescent in some forms, but not more so along the midrib than elsewhere and not tufted in the axils. *Inflorescence more or less corymbose;* fruit 6 to 10 mm. in diameter, without any trace of bloom, flesh thin and sour ..... 18.

[1] Since flowers appear before mature foliage, that part of the key referring to the inflorescence has been italicised to facilitate its use with the character of material to be identified.

3. Serrations of the leaves rounded or obtuse (sometimes apparently acute by the presence of a pointed gland, rarely acute in *P. subcordata* Pacific coast species with incisely serrate leaves, and in *P. orthosepala* with glabrous leaves), mostly glandular, at least when they first unfold. *Flowers with glandular calyx lobes, except in P. orthosepala* and *P. angustifolia, species in which the calyx lobes are merely ciliate, and in P. venulosa with flowers only 6 to 7 mm. broad* ..... 4.

3. Serrations of the leaves pointed or acute, the teeth mostly not gland tipped when the leaves unfold. *Flowers with calyx lobes eglandular except sometimes inconspicuously glandular in P. americana* ..... 5.

4. Leaves broadly oblong-ovate to slightly obovate, not at all trough shaped, the margin often doubly serrate. *Flowers 2 to 2.5 cm. broad, the calyx usually with a reddish tinge, at least in age, the lobes lanceolate, conspicuously glandular-serrate* ..... *P. nigra.*

4. Leaves ovate, ovate-lanceolate, oblong-lanceolate or sometimes oblong-oval (often orbicular in *P. subcordata*, Pacific coast species) the margin rarely doubly serrate. *Flowers 8 to 15 mm. broad, with calyx rarely or only slightly reddish, the lobes oblong-ovate, entire, glandular or eglandular* ..... 7.

5. Leaves rather abruptly acuminate, the margins rather coarsely and deeply serrate. *Flowers 18 to 25 mm. broad.* Fruit red or reddish yellow, 18 to 30 mm. in diameter ..... 6.

5. Leaves gradually acuminate or merely acute, the margins rather finely serrate. *Flowers 6 to 14 mm. broad.* Fruit purple or more rarely red or yellow, about 15 mm. or less in diameter .. 14.

6. Tree sprouting from the roots and forming thickets, bark scaly on older trunks; leaves glabrous or sparingly pubescent or in the subspecies tomentose below, acuminate even when they first unfold. Fruit ripening from August to October or in the South in July, stone oval ..... *P. americana.*

6. Tree not sprouting from the roots and not forming thickets, bark somewhat furrowed on older trunks; leaves usually strongly tomentose below, commonly somewhat obtuse when they first unfold. Fruit ripening in October and November, rarely in September, stone obovoid to nearly round ..... *P. mexicana.*

7. Leaves orbicular to oval or rarely ovate, mostly obtuse at the apex, the margins incisely serrate, sometimes doubly so. *Flowers 15 to 18 mm. broad* ..... *P. subcordata.*

7. Leaves ovate, ovate-lanceolate to oval, mostly acute at the apex, the margins crenate or crenulate, or at least not incisely serrate. *Flowers 8 to 15 mm. broad* ..... 8.

8. Leaves rather thick, ovate or ovate-lanceolate, only slightly lustrous on the upper surface, veins usually conspicuous below, the margin rather coarsely and irregularly serrate ..... 9.

8. Leaves usually rather thin, oblong-lanceolate to oval, lustrous on the upper surface, veins not very conspicuous, the margin finely and evenly serrate ..... 12.

9. Tree not sprouting from the roots and not forming thickets; leaves 7.5 to 11 cm. long. *Flowers 12 to 15 mm. broad* ..... *P. hortulana.*

9. Shrubs sprouting from the roots and forming thickets; leaves mostly 5 to 7.5 cm. long. *Flowers 9 to 10 mm. broad* ..... 10.

10. Young branches glabrous; pubescence of the leaves usually more abundant along the midrib and more or less tufted in the axils of the lateral veins. *Flowers 9 or 10 mm. broad, the calyx lobes glandular* ..... 11.
10. Young branches more or less pubescent; pubescence of the leaves usually neither more abundant along the midrib than elsewhere, nor tufted in the axils of the lateral veins. *Flowers 6 to 10 mm. broad*, the calyx lobes eglandular ..... 17.
11. Leaves lanceolate to ovate-lanceolate, rather strongly conduplicate or trough shaped. Fruit ripening in July and August.. *P. reverchonii.*
11. Leaves ovate to oblong-ovate or sometimes slightly obovate, usually not trough shaped. Fruit ripening in June ..... *P. rivularis.*
12. Leaves usually 6 to 10 cm. long. *Calyx lobes glandular* ..... *P. munsoniana.*
12. Leaves mostly 2 to 6 cm. long. *Calyx lobes eglandular* ..... 13.
13. Leaves oblong-lanceolate to obovate-lanceolate, mostly 4 to 6 cm. long. *Flowers 10 to 14 mm. broad.* Fruit ripening at the Arnold Arboretum in September ..... *P. orthosepala.*
13. Leaves lanceolate, oval-lanceolate, or oblong-oval, 2 to 6 cm. long. *Flowers 8 to 12 mm. broad.* Fruit ripening from the last of May, in the South, to the first of September (subsp. *watsoni*) ..... *P. angustifolia.*
14. Leaves lanceolate to oval-lanceolate or sometimes ovate or oval, not strongly reticulate veiny below, and glabrous or pubescent. *Flowering pedicels glabrous or only sparingly pubescent* ..... 15.
14. Leaves ovate, oval, or nearly orbicular, rarely somewhat obovate, rather strongly reticulate veiny below, and pubescent. *Flowering pedicels strongly pubescent* ..... 16.
15. Petioles mostly 7 to 12 mm. long. *Calyx lobes only slightly shorter than the tube.* Tree of the northern Alleghenies and southern New England ..... *P. alleghaniensis.*
15. Petioles mostly 5 to 9 mm. long. *Calyx lobes mostly shorter than the tube.* Tree of the Southern States ..... *P. umbellata.*
16. Leaves orbicular to oblong-orbicular, obtuse at the apex ..... *P. gravesii.*
16. Leaves ovate or oval, rarely slightly obovate, usually acute at the apex ..... *P. maritima.*
17. Leaves oval or lance-oval, rarely ovate or obovate-lanceolate, narrowed or rounded toward the base, petioles 5 to 8 mm. long. *Flowers 9 to 10 mm. broad, pedicels and calyx finely pubescent* ..... *P. gracilis.*
17. Leaves ovate to oblong-ovate, usually rounded at the base, petioles 10 to 12 mm. long. *Flowers 6 to 7 mm. broad, pedicels and calyx glabrous or sparingly pubescent* ..... *P. venulosa.*
18. Leaves lanceolate, oblong-lanceolate or oblong-oval, narrowed or rounded at the base, the apex acute or acuminate. *Flowering pedicels without subtending bracts, or when present the bracts minute, not foliaceous.* Eastern and Rocky Mountain species. *P. pennsylvanica.*
18. Leaves oblong-oval, obovate or rarely lanceolate, narrowed or even cuneate toward the base, obtuse or rarely acute at the apex. *Flowering pedicels subtended by small foliaceous dentate or laciniate bracts.* Southwestern and Pacific coast species.... *P. emarginata.*
19. Leaves usually narrowly oblanceolate-spatulate and acute..... *P. pumila.*
19. Leaves oblong-spatulate to oval or somewhat obovate, acute or obtuse ..... 20.

20. Petioles 5 to 10 mm. long, leaves 3.5 to 7 cm. long, obtuse or sometimes acute at the apex. Fruit about 10 to 15 mm. in diameter. Eastern and northern species..... *P. cuneata.*
20. Petioles 5 to 6 mm. long, leaves 3 to 4.5 cm. long, acute or rarely obtuse at the apex. Fruit about 15 to 18 mm. in diameter. Western species..... *P. besseyi.*

DESCRIPTIONS OF THE SPECIES AND THEIR HYBRIDS.

Prunus Nigra Ait.

(Canada plum.)

Prunus nigra Aiton, 1789, Hort. Kew., v. 2, p. 165.
Prunus borealis Poir., 1804, *in* Lam. Encycl., t. 5, p. 674.
Prunus mollis Torr., 1824, Fl. North and Mid. U. S., v. 1, p. 470.
Prunus americana nigra Waugh, 1896, *in* Vt. Agr. Exp. Sta. Bul. 53, p. 58.
Cerasus borealis Michx., 1803, ? Fl. Bor. Amer., t. 1, p. 286.
Cerasus nigra Lois., 1812, Nouv. Duham., v. 5, p. 32.

Leaves (Pl. I, fig. 2) oval or obovate, mostly 8 to 13 cm. long, 4.5 to 7 cm. broad, rounded at the base, abruptly acuminate toward the apex, green and glabrous above, or with scattered hairs along the veins, pale and becoming glabrous below except along the midvein and in the axils of the lateral veins, or sometimes with scattered hairs along the lateral veins, when young usually somewhat pubescent above and rather strongly so below, rarely entirely glabrous, the margins rather coarsely and unevenly serrate, the serrations rounded and in the young leaves glandular, the glands usually remaining as small callous points; petioles 10 to 18 mm. long, pubescent on the upper surface with longish hairs, or sometimes entirely glabrous, glands one to three near the apex or often entirely absent; stipules linear or sometimes lobed, the margins glandular. Flowers 2 to 2.5 or sometimes even 3 cm. broad, appearing before the leaves from the last of April in the southern portion of its range to the last of May in northern localities; umbels nearly sessile, mostly 2 or 3 flowered; pedicels 10 to 20 mm. long, usually about 18 mm., glabrous or very rarely finely pubescent in some western material; calyx usually somewhat reddish, in age frequently conspicuously so, the tube rather narrowly obconic, about 3.5 to 4 mm. long, or in cultivated trees the tube and lobes sometimes each 5 mm. long, glabrous, calyx lobes oblong-ovate or oblong-obtuse, glandular serrate, glabrous or rarely pubescent on the inner surface mainly toward the base, and still more rarely with a few scattered hairs on the outer surface, the lobes at length spreading or reflexed; petals white or in age with a decided tinge of pink, oblong-ovate to nearly orbicular and abruptly contracted to a claw, 10 to 12 mm. long, 6 to 10 mm. broad, usually erose toward the apex, sometimes conspicuously so. Fruit oblong-oval, 2.5 to 3 cm. long, 1.8 to 2.5 cm. in diameter, orange red or sometimes deep crimson, varying to orange yellow, nearly destitute of bloom,

ripening from the second week in August to the end of September; stone (Pl. IX, figs. 1 to 7) oblong-oval, rather flat, about 20 mm. long, 14 mm. broad, obliquely truncate at the base and rounded at the apex, grooved on either side a short distance from the ventral edge, and with a single groove along the dorsal edge.

Prunus nigra is a small tree, attaining a maximum height of about 30 feet. It sprouts from the roots and frequently forms small thickets. The grayish bark of the trunk exfoliates in platelike scales, while that of the young twigs is smoother and very dark gray. The branches are often furnished with spinescent branchlets, and the winter buds are lanceolate in outline, acute, and 4 to 5 mm. long. The wood is heavy, close grained, and strong.

While *Prunus nigra* has often been confused with *P. americana*, it is nevertheless one of the most distinct and easily recognizable of the native species. The foliage is distinguished from the latter species by the rounded instead of pointed serrations of the leaves. The flowers are larger, have a more pinkish tinge when fading, and appear earlier in the same locality; the calyx lobes are glandular serrate and usually glabrous, while in *P. americana* they are inconspicuously glandular or eglandular and pubescent within.

Prunus nigra[1] grows (fig. 1) in the alluvial valleys of streams or often on limestone hills, and ranges from the vicinity of the St. John River in western New Brunswick through Maine, excepting the extreme northern portion, to the valley of the St. Lawrence and westward to the southern shores of Georgian Bay and nearly to the shores of Lake Michigan in the southern peninsula of the State of Michigan. It extends southward to central Massachusetts, though probably as an introduced plant in that State, but occurs apparently as a native at Ithaca, N. Y., and in northern Ohio near the Black River, in Lorain County; thence its line of southern distribution moves northward to the vicinity of Lake St. Clair, Lansing, and Grand Rapids, Mich. It does not occur in the sandy soils of the lake region of western Michigan, but reappears in northeastern Illinois, extending from near Joliet to the southern part of Dodge County and the vicinity of Milwaukee, in southeastern Wisconsin. It does not appear to have been observed in central Wisconsin, but is found in the western part of the State, where it extends northward from the vicinity of the Wisconsin River and through eastern Minnesota to the region west of Port Arthur, in western Ontario, and to the Winnipeg Valley, where it was collected by Bourgeau in 1857.

[1] Although this species is reported by Hooker (33, p. 168) from Newfoundland, Dr. M. L. Fernald, who has collected extensively in New Brunswick and Newfoundland, writes that he has no knowledge of it east of the St. John River system. He says: "It is fairly abundant on terraces and limey slopes near the mouth of the Aroostook River, which is its northeastern limit, I think." The herbarium material examined confirms this view of the northeastern limit of the species.

While not the first American species to come to the notice of European explorers, *Prunus nigra* was nevertheless one of the earliest, having been observed by Jacques Cartier in the possession of Indians whom he met in the Bay of Chaleur on the occasion of his first voyage to America in 1534. Again on his second voyage Cartier found trees near the Isle of Orleans, and as late as 1895 the species still grew in the vicinity, specimens having been collected on the island by J. G. Jack, of the Arnold Arboretum.

Notwithstanding the fact of its being seen by the early European voyagers, the species did not receive botanical description until 1789, when it was described briefly by William Aiton from cultivated specimens. It is said by Aiton to be a "native of Canada" and to have been introduced into English gardens by Lee & Kennedy, nurserymen

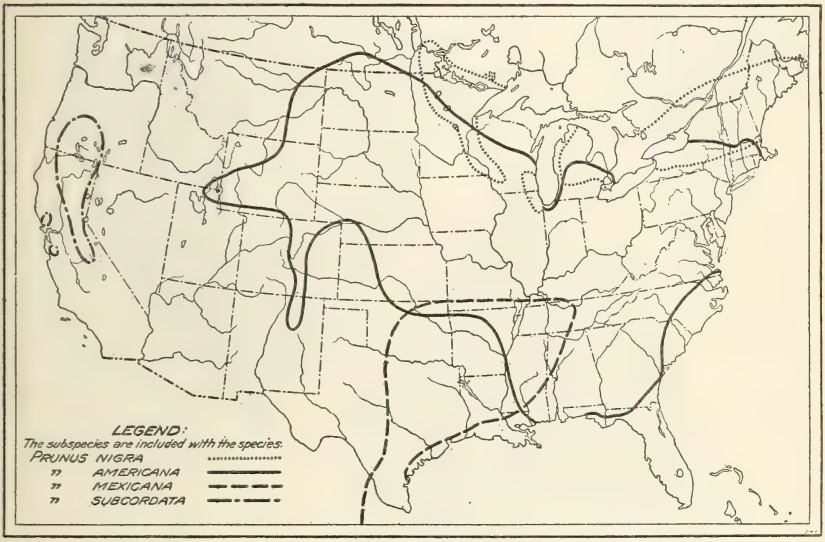


FIG. 1.—Outline map of the United States, showing the distribution of native American species of Prunus: *Nigra*, *americana*, *mexicana*, and *subcordata*.

at Hammersmith, near London. Its introduction on the Continent may have been somewhat earlier, for it is this species that is figured by Poiteau and Turpin (20) as La Galissonnière, *Prunus hiemalis*. These authors state that M. de la Galissonnière was sent to Canada as governor by Louis XV in 1750 and that seeds were sent by him which were planted in the "Jardin du Roi, à Paris." Though the date of introduction is not given, it must have occurred within a few years, for Galissonnière remained in Canada but a short time. In fact, it is quite possible that Lee & Kennedy obtained the species from France. The type specimen is at the Natural History Museum, London. The habitat of *Cerasus borealis* Michx.[1] is given as

[1] Bailey, L. H. (5, p. 193). "Of his [Michaux's] *Cerasus borealis* there are two things on the sheet, but they are both forms of *P. hortulana*."

"in America boreali et in altis montibus Novae Angliae," and the type specimen is probably in the Michaux herbarium at the Muséum d'Histoire Naturelle de Paris. Michaux's description is scarcely distinctive, but if he really had a specimen from the mountains of New England it could not be other than *Prunus nigra*. *P. mollis* was described by John Torrey from a specimen collected by Chester Dewey "in Massachusetts, on the road from Williams College to Troy." This specimen is preserved in the Herbarium of Columbia University, at the New York Botanical Garden, Bronx Park, New York City. The legend on the sheet reads "I found this on the road to Troy and the people said it was not set out as they believed, for it is common in the woods." The specimen is unquestionably *P. nigra*.

Prunus nigra is grown locally in various parts of Canada and the fruit is sold on the markets in many of the cities, yet it has given rise to very few named varieties and has not occupied the place in American horticulture which it deserves. The strength of the wood enables the tree to withstand the heavy snows and severe storms of Canada with less injury from breaking than is the case with *P. americana*, and this fact with its hardiness should commend it for regions subject to such conditions.

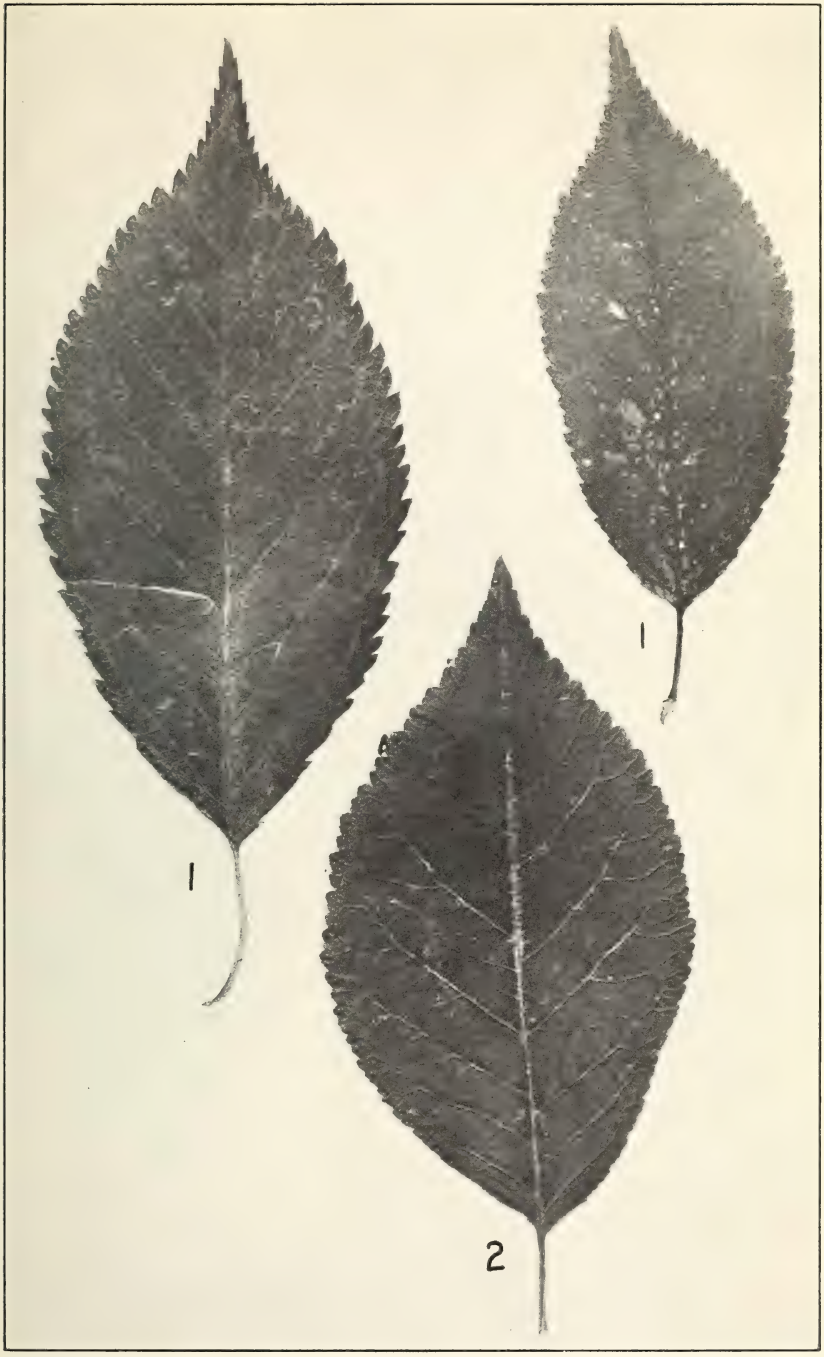
The varieties Aitkin, Cheney, Crimson, Itasca, Odegard, Oxford, Smith Red, Snelling, and Whyte, although showing slight differences, are typical of the species. The varieties Hanson and Wazata have leaves narrower in proportion to their length and with more unequal serrations; these are rounded, however, and the calyx characters are those of *Prunus nigra*. Similar specimens have also been collected in a wild state.

Prunus Americana Marsh.

(Wild plum.)

Prunus americana Marsh., 1785, Arb. Amer., p. 111.
Prunus latifolia Moench, 1785, Verz. Ausl. Bäume, p. 85.
Prunus hiemalis Michx., in part, 1803, Fl. Bor. Amer., t. 1, p. 284.
Cerasus americana Hook. and Arn., 1835, *in* Comp. Bot. Mag., v. 1, p. 24.
Prunus ignotus [*ignota*] Nelson, 1906, *in* Bot. Gaz., v. 42, no. 1, p. 53.

Leaves (Pl. I, fig. 1) oval or sometimes oblong-oval to narrowly obovate, 6 to 10 cm. long, 2.5 to 5 cm. broad, acuminate toward the apex and usually rather gradually narrowed at the base, green and glabrous above, pale and glabrous below, except along the midvein, or entirely glabrous or rarely thinly and inconspicuously pubescent, the margin sharply and sometimes doubly serrate; petioles 7 to 14 mm. long, pubescent along the upper surface or sometimes glabrate, eglandular, or with one or two glands near the apex; stipules linear or lobed and the lobes linear, glandular along the margin. Flowers 18 to 25 mm. broad, in nearly sessile umbels of 3 to 4, appearing with



LEAVES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—I: 1, PRUNUS AMERICANA; 2, P. NIGRA.

(Natural size.)

LEAVES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—II: 1, PRUNUS MEXICANA; 2, P. SUBCORDATA.

(Natural size.)

the leaves from the first week in April in the South to the latter part of May and before the leaves in the northern part of its range; pedicels slender, mostly 7 to 15 mm. long, glabrous; calyx tube obconic and about 3 mm. long, glabrous or inconspicuously pubescent, the lobes as long or slightly longer than the tube, lanceolate or oblong-lanceolate, obtuse or sometimes acute, obscurely glandular on the margin mainly above the middle, or sometimes eglandular, dentate toward the apex, glabrous or inconspicuously pubescent on the outer and soft-pubescent on the inner surface, reflexed at anthesis; petals oblong-oval or obovate and narrowed to a claw, mostly 8 to 10 mm. long, 4.5 to 6 mm. broad, entire or obscurely erose toward the apex, sometimes slightly ciliate near the base. Fruit extremely variable in the time of ripening, ranging from early in July in the South and from the end of August to early October in the North, subglobose or sometimes even somewhat oblate to slightly elongated, 1.8 to 2.5 cm. long, varying from reddish orange to red, marked with numerous minute, whitish dots and with a bluish bloom or sometimes nearly destitute of bloom, skin rather thick and tough, flesh yellow; stone (Pl. VIII, figs. 1 to 16) oval, turgid, 13.5 to 16 mm. long, 10 to 14 mm. broad, narrowed at the base and pointed or sometimes rounded at the apex, grooved on either side a short distance from the ventral edge, sometimes also with a slight ridge on either side and a shallow groove along the ventral edge as on the dorsal, the surface smooth or sometimes obscurely rugose.

The tree reaches a maximum height of about 35 feet with a trunk diameter of about 12 inches. It sometimes grows singly, but more often sprouts from the roots and frequently forms thickets of considerable extent. The branches are more or less spinescent, spreading, or often somewhat drooping toward the extremities, bark of the trunk dark brown, exfoliating in platelike scales, that of the young twigs chestnut colored and eventually turning dark brown; winter buds 3 to 4 mm. long, narrowly ovate, acute. The wood is heavy, close grained, and fairly strong.

Prunus americana is distributed (fig. 1) from central Massachusetts and central New York westward to central Michigan and northern Indiana, thence northwestward to the vicinity of Brandon, Manitoba. It reaches its extreme western limit in the vicinity of Logan in northern Utah, and occurs along the eastern foothills of the Rocky Mountains in Colorado extending southward to Las Vegas in New Mexico. It apparently does not occur in the dry region of eastern Colorado or in the extreme western part of Kansas, but farther east it extends southward to southern Kansas and through central Missouri, while east of the Mississippi River it extends southward nearly to the Gulf, in Mississippi and Alabama. It is found in northern Florida, but does not occur in the peninsular part of the

State. It evidently reaches nearly to the coast in the vicinity of Savannah, Ga., but is not found in the Coastal Plain of the Carolinas.

With the possible exception of *Prunus pennsylvanica*, *P. americana* is the most widely distributed of any of the native species, and it appears also to be one of the most variable. In the Eastern States it grows mainly in rich alluvial soils, in the Southern States it is frequently met with in the mountain region, but sometimes occurs in river swamps, while in the prairie States of the Mississippi Valley it is found on bottom lands and sometimes on dry uplands. Toward its western limits it is smaller and often assumes even a shrublike appearance. Material of the species from the western portion of its range indicates a form having leaves usually more glabrous and of a lighter green color, with a greater tendency to fold in drying. In the East the calyx lobes are usually glandular and minutely toothed toward the apex, while west of the Mississippi River the calyx lobes are usually, though not always, eglandular and entire. There is also a tendency for the stone in eastern specimens to be shorter in proportion to its breadth and more turgid than in western material. There are so many exceptions to the constancy of these characters in a definite geographical region, however, that it seems unwise, and in fact apparently impossible, to distinguish any form, even as a subspecies. In southwestern Missouri a grove was found, the trees of which appeared rather different from others in that vicinity. These trees were 10 to 15 feet high; leaves oval-lanceolate to lanceolate, 5 to 7 cm. long, 2 to 3 cm. broad, rather long acuminate at the apex, gradually narrowed toward the base, green and glabrous above, pale and rather loosely pubescent below; flowers about 12 mm. broad, pedicels 6 to 8 mm. long, glabrous, calyx entirely glabrous on the outer surface, tube about 2 mm. long, the oblong lobes about as long, obtuse, ciliate on the margin, eglandular, hairy within, at least toward the base; petals 5 to 6 mm. long, oblong-oval to oblong-cuneate; fruit globose.

Prunus americana was probably the first American species to be described botanically, for it is apparently included by Plukenet in 1696. It was not named binomially until 1785, when it was described by Marshall. So far as known, no types of Marshall's plants are in existence, but there can be little possibility of mistaking the identity of his species in this case, and his material doubtless came from eastern Pennsylvania. *Prunus latifolia* was described by Moench in the same year in which Marshall's Arbustrum was published. Moench described his species from material grown from seed obtained in America. *P. hiemalis* was described from "Canada, Virginia et in umbrosis Carolinae." *P. ignota*, based on specimens collected by C. S. Crandall on the banks of the Cache la Poudre, near Fort Collins, Colo., does not differ from the species.

It has been suggested by Tuckerman (35, p. 99) in his comments on the plants mentioned by Josselyn in 1672, that the following reference to plums by that author included *Prunus americana* as well as *P. maritima*:

Plumb Tree, several kinds, bearing some long, round, white, yellow, red, and black plums; all differing in their Fruit from those in England.

Nevertheless, all the colors described except white occur in *P. maritima*, and it is doubtful if *P. americana* is indigenous to eastern Massachusetts. It is therefore quite possible that Josselyn had seen only *P. maritima*.

Horticulturally, *Prunus americana* is one of the most important species and has probably received the greatest attention. A large number of varieties have been named, and these have originated almost entirely in the Middle West, where the fruit apparently is of better quality than is the case in the eastern part of its range. Most of the varieties also show an elongated stone, but since a larger fruit is almost invariably accompanied by a larger and longer stone, this does not necessarily indicate a distinct form, as might be inferred from a study of cultivated material alone. In this connection, L. H. Bailey (2, p. 3) says:

Notwithstanding its wide range, most of its cultivated varieties have come from its northwest limits, as northern Illinois, Wisconsin, Minnesota, Iowa, and Kansas. This fact is an indication that the western plum may be a distinct species from the eastern and southwestern types, and I should not be surprised if we ultimately find this to be true. I have looked in vain, however, for characters with which to separate them.

Among the varieties belonging to this species may be mentioned the following: Advance, Atkins, Blackhawk, Brittlewood, Crescent City, Deep Creek, De Soto, Eaton, Forest Garden, Hawkeye, Hunt, Iowa Beauty, Mollie, Ocheeda, Stoddard, and Weaver.

Prunus Americana Hybrids.

Among cultivated varieties there are apparently several hybrids of *Prunus americana* with *P. triflora* (Pl. XIII, fig. 9) and a smaller number with *P. angustifolia watsoni*, *P. besseyi*, *P. hortulana*, *P. hortulana mineri*, *P. munsoniana*, *P. pumila*, *P. simonii*, and × *P. utahensis* (*P. besseyi* × *angustifolia watsoni*). (Pl. XIII, fig. 14.) Some of these show much promise horticulturally for some sections of the West.

Prunus Americana Lanata Sudworth.

Prunus americana lanata Sudw., 1897, U. S. Dept. Agr., Div. Forestry Bul. 14, p. 237.

Prunus americana mollis Torr. and Gray, 1840, Fl. N. Amer., v. 1, p. 407, in part.

Prunus lanata Mackenz. and Bush, 1902, Man. Fl. Jackson Co., Mo., p. 109.

Leaves ovate to oblong-ovate or oblong-oval, rarely slightly obovate, mostly 6.5 to 10 cm. long, 3 to 6 cm. broad, narrowed at the base, acuminate at the apex, the margins sharply serrate, appressed pubescent above or sometimes glabrous, densely pale soft-pubescent below or rarely thinly pubescent, the pubescence usually becoming fuscous with age; petioles rather stout, usually 9 to 16 mm. long, pubescent or glabrate, eglandular or with one or two glands near the apex and the glands often short stalked. Flowers 15 to 20 mm. broad, in umbels of 3 to 4, the pedicels 9 to 12 mm. long and glabrous or pubescent; calyx usually appressed pubescent or sometimes nearly or quite glabrous, the tube campanulate, about 3 mm. long, the obtuse lobes as long as the tube, soft-pubescent within, eglandular and entire or minutely and obscurely dentate toward the apex, reflexed in age; petals oblong oval, 8 to 9 mm. long, narrowed to a usually rather long claw. Fruit similar to that of *Prunus americana;* stone 15 to 22 mm. long, 11 to 13 mm. broad, oval and grooved as in the species.

Prunus americana lanata is occasionally found in Illinois, but more commonly in southern Iowa and southward to southern Missouri.

The name *Prunus americana lanata* Sudworth was based on *P. americana mollis* Torrey and Gray, not *P. mollis* Torrey, which is identical with *P. nigra* Aiton.

The subspecies or variety *mollis* as established by Torrey and Gray was evidently intended to include the forms with large pubescent leaves and probably included in addition to the present subspecies *Prunus nigra* and *P. mexicana*. Later authors restricted the name to *P. mexicana* and the pubescent form of *P. americana*, while Bush and Mackenzie in their use of the name *lanata* definitely applied it, in the "Flora of Jackson County, Mo.," to the hairy form of *P. americana*. In the same year these authors (49, p. 83) in another publication give the following as the range of *P. lanata:* "Common along rivers and bottoms from Illinois and Iowa to Missouri, Texas, and Mexico." The inclusion of Texas and Mexico refers to *P. mexicana*. Torrey and Gray did not give the distribution of the variety separately from the species which was: "Banks of streams and in hedges, Canada! (from the Saskatchawan!) and New England States! to Georgia and Louisiana! and Texas!" There can be no question of the application of the name *lanata* to this form as a proposed species, and it is therefore retained as the name of the subspecies. There is apparently no character which is constant and definite enough to distinguish this form as a species. The quantity of pubescence is extremely variable and though the calyx lobes are usually entire and eglandular that is sometimes the case with the species. It is mainly only the more marked pubescence, variable though it may be, that can be relied on as the distinguishing character.

Few horticultural varieties belong to the subspecies, but American Eagle, Quaker, Van Buren, and Wolf are referable to it.

Prunus Mexicana Wats.

(Big-tree plum.)

Prunus mexicana Wats., 1882, *in* Proc. Amer. Acad. Sci., v. 17 (n. s. v. 9), p. 353.
Prunus americana mollis Torr. and Gray, 1840, Fl. N. Amer., v. 1, p. 407, in part.
Prunus australis Munson; Waugh, 1898, *in* Bot. Gaz., v. 26, no. 1, p. 52.
Prunus reticulata Sarg., 1911, Trees and Shrubs, v. 2, pt. 3, p. 151, t. 162.
Prunus tenuifolia Sarg., 1911, Trees and Shrubs, v. 2, pt. 3, p. 153, t. 163.
Prunus polyandra Sarg., 1911, Trees and Shrubs, v. 2, pt. 3, p. 155, t. 164.
Prunus arkansana Sarg., 1911, Trees and Shrubs, v. 2, pt. 3, p. 157, t. 165.

Leaves (Pl. II, fig. 1) oblong-obovate or obovate, mostly 7 to 10.5 cm. long, 4 to 6.5 cm. broad, the margin sharply serrate or sometimes doubly serrate, rounded or even subcordate at the base and acute or abruptly acuminate toward the apex, yellowish green, and soft-pubescent above with short appressed hairs at least when young, pale green below and more strongly pubescent with longer hairs, veins at length rather prominent or sometimes strongly reticulate below and often in age appearing somewhat rugose above; petioles usually stout, velutinous, though sometimes sparingly so, mostly 10 to 12 mm. long, usually with one or more short-stalked glands at or near the apex or rarely on the base of the leaf blade; stipules usually lobed, the lobes linear and glandular serrate. Flowers about 15 to 18 mm. broad in nearly sessile umbels of 2 to 4; pedicels glabrous or rarely pubescent, usually 9 to 12 mm. or sometimes even 15 mm. long; calyx campanulate, the upper part of the tube and lobes soft-pubescent with short hairs, the tube 2.5 to 3 mm. long, the lobes oblong or ovate-oblong and as long as the tube or nearly so, dentate at the apex or sometimes entire, obscurely glandular in the margin, rather strongly pubescent within, at least toward the base, and usually reflexed; petals mostly 6 mm. to very rarely 10 mm. long, sometimes sparingly and obscurely pubescent on the outer surface toward the base, varying even in the same specimen from ovate-orbicular and abruptly contracted to a short claw to oblong-oval and gradually narrowed to a claw, the margin usually entire. Fruit ripening in October and November, rarely earlier, globose or very rarely oblong, 18 to 30 mm. in diameter or rarely larger, dark purplish red with bluish bloom; stone (Pl. VIII, figs. 17 to 24) obovoid to nearly round, 12.5 to 16 mm. long, 10 to 12 mm. broad, turgid, usually pointed at the base and rounded at the apex or sometimes slightly pointed, slightly grooved on either side a short distance from the ventral edge and inconspicuously grooved, or the groove entirely absent along the dorsal edge, surface smooth, except for a few usually indistinct ridges toward the base.

The tree attains a maximum height of about 40 feet and occurs singly or in groves, but never suckers or forms thickets. The bark of the trunk exfoliates in platelike scales when young, later becoming furrowed, while the larger branches retain the bark character of the young trunk; the bark of the twigs at flowering is usually grayish, that of the young growth in summer dull chestnut.

Prunus mexicana occurs (fig. 1) in open woods in rich alluvial bottom lands, on the upland prairie soils, and even in sandy loam, and ranges from southwestern Kentucky and western Tennessee southwestward through northwestern Louisiana to the vicinity of Lerios, Coahuila, Mexico, the type locality, and central Nuevo Leon, where scattered trees occur on the northern slope of the Sierra Madre at about 3,000 feet elevation. Its range extends westward through the extreme southern part of Missouri to central Oklahoma and central Texas.

Prunus mexicana varies somewhat, but not more so than may be expected in a species of its range. Specimens from Feliciana Parish, La., have the calyx tube entirely glabrous, except for a few longish hairs toward the base, with pedicels 17 to 18 mm. long. The calyx tube in Arkansas specimens, *P. polyandra* and *P. arkansana* Sarg., is less pubescent than is usual in Texas material, but is somewhat variable in this respect even in the same locality. A form, *P. tenuifolia* Sarg., in the vicinity of Larissa, Cherokee Co., Tex., shows the greatest departure from the usual character of the species of any observed, since it has a finely pubescent calyx with a few longish hairs toward the base and on the pedicels, while the immature fruit indicates an oblong stone. *P. reticulata* Sarg., was described from Grayson County, Tex. The original material of the species published by Sargent has been studied, and the characters on which they are based were very carefully considered. They are all of the type known as the big-tree plum, and horticulturally these differences are of less importance than variations in what is still recognized as a single species in *P. americana*. The rank to be assigned the forms under discussion depends upon one's conception of what constitutes a species.

Although long confused with *Prunus americana* and in the herbarium sometimes difficult to distinguish from *P. americana lanata*, the species is nevertheless a very distinct one. It never forms thickets, as does *P. americana* and its subspecies, but occurs always as a tree with a well-defined trunk, which in the older trees differs in its furrowed bark. The young leaves as they appear are mostly somewhat obtuse at the apex instead of acuminate; the older leaves are usually broader in proportion to their length, and the serration of the margin is slightly less pronounced. The flowers also have petals somewhat broader in proportion to their length than in *P. americana*, while the stone is obovoid or round and more turgid.

Horticulturally, the species has received little attention, though the fruit is gathered from the wild trees and made into preserves. The fruit is variable in size and quality, and a careful search for desirable forms might form the basis for the development of late-ripening varieties of value in some of the Southern States. It is apparently more susceptible to frost injury than *Prunus reverchonii* and, though drought resistant to an appreciable extent, is probably less so than the latter species. It has been used as a stock i n the nursery of T. V Munson at Denison, Tex., with very satisfactory results, and its vigor and nonsuckering character may lead to its further use.

Prunus Mexicana Hybrids.

Prunus mexicana has been hybridized with *P. triflora*, and wild trees in the vicinity of Henrietta, Tex., are apparently hybrids with *P. reverchonii*. One of these has been named horticulturally and for a time was offered by several nurseries, but it has little to commend it.

Prunus Subcordata Benth.

(Pacific or western wild plum.)

Prunus subcordata Benth., 1848, Pl. Hartw., p. 308.
Prunus subcordata kelloggii Lemmon, 1890, *in* Pittonia, v. 2, p. 67.

Leaves orbicular (Pl. II, fig. 2), oblong-orbicular, or sometimes ovate, rounded, subcordate, or rarely gradually narrowed at the base and usually rounded and obtuse at the apex, 2.5 to 5 cm. long, 1.5 to 4 cm. broad, the margins incisely serrate, sometimes doubly so, the teeth at first gland tipped, the glands usually falling away in age, leaving the serrations more or less obtuse, or more rarely the serrations acute, the young leaves usually pubescent, at least below, becoming glabrous as they mature or sometimes remaining rather strongly pubescent below, even in age; petioles 7 to 12 mm. long, glabrous or pubescent, glandular near the apex or sometimes the glands on the base of the blade; stipules lanceolate with glandular margins. Flowers 15 to 18 mm. broad, in umbellike clusters of 2 to 4, appearing with the leaves from the first of April to about the middle of May, according to the locality; pedicels and calyx pubescent or glabrous, the pedicels 7 to 13 mm. long; calyx tube campanulate, about 3 mm. long, the lobes usually slightly longer, oblong or oblong-obovate, obtuse, and glandular-serrate, usually glabrous within; petals entire, 7 to 9 mm. long, oblong or obovate and abruptly contracted to a short claw. Fruit ripening in August or September, slightly oblong, 1.5 to 3 cm. long, dark red, purplish red, or rarely yellow, variable in quality, though often excellent; stone oblong, oval (Pl. IX, figs. 8 to 15), or rarely somewhat orbicular, 12 to 18 mm. long, 10 to 17 mm. broad, oblique or somewhat pointed at the base and rounded with an obscure point at the apex, variously ridged

and grooved near the ventral edge, rather conspicuously grooved along the dorsal edge, somewhat ridged toward the base, and the surface obscurely roughened.

Prunus subcordata is often only a shrub 3 to 10 feet high with crooked stem and branches. In moist fertile soils it grows to a height of 15 to 25 feet. It often forms extensive thickets or clumps. The bark of the trunk is grayish brown, furrowed, and somewhat scaly; the main branches are rather thick and start out nearly horizontally from the trunk. The young twigs are reddish, either glabrous or pubescent, and marked with orange-colored lenticels.

The species is found (fig. 1) in central Oregon and northeastern California, thence southward along the western slope of the Sierra Nevada to the Yosemite Valley, where it occurs at an altitude of 4,000 feet, in the coast ranges of California in Lake County, in the hills east of Santa Rosa, and on Black Mountain, Santa Clara County.

Prunus subcordata was originally described from the upper valley of the Sacramento, where it appears to have been first collected by Karl Theodor Hartweg in 1836 or 1837.

Prunus subcordata kelloggii does not appear to show any botanical differences from the type. The larger size of the tree and the larger and superior quality of the fruit ascribed to the proposed subspecies are not correlated with any other character; and these are variations that occur in all the species of the genus. The author of this supposed form says of it:

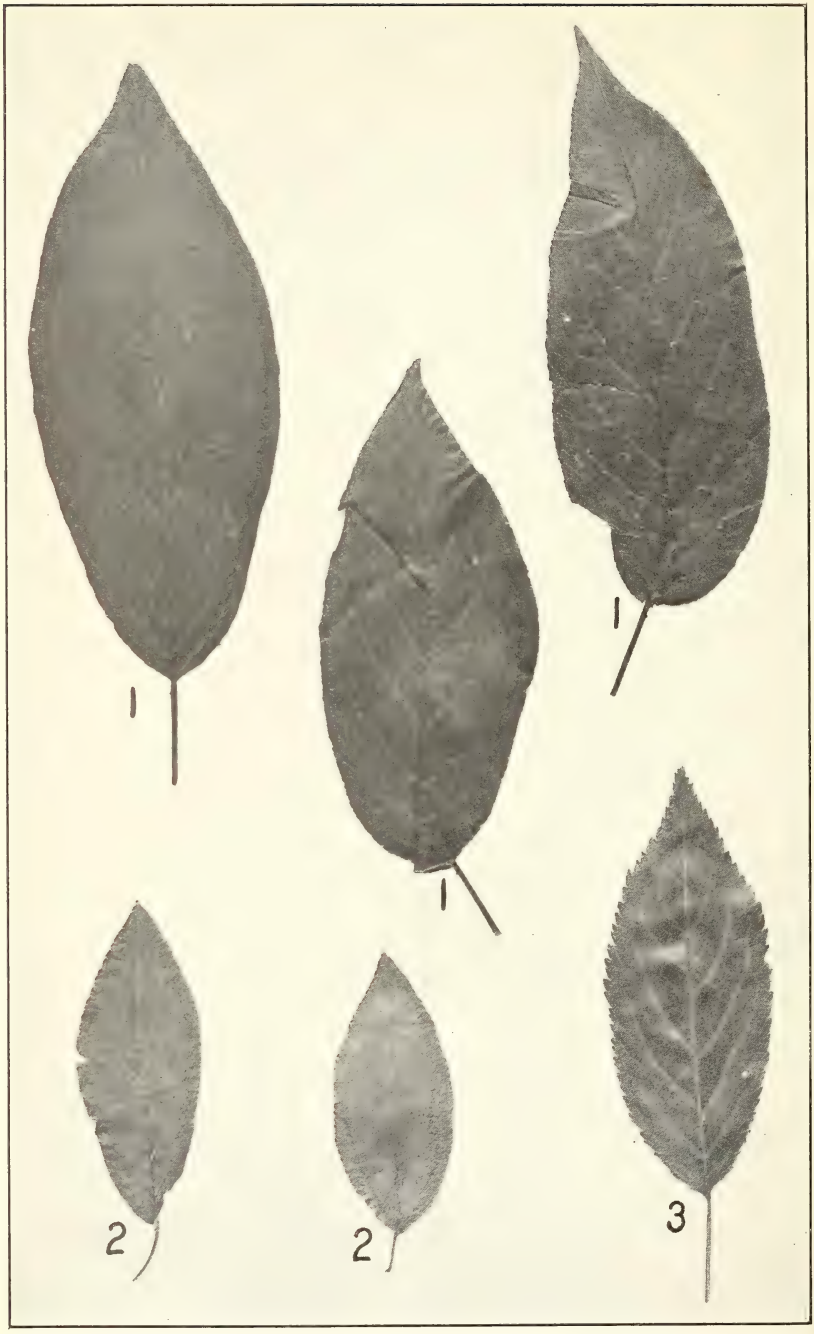
> The variety is abundant near Sierra City, Sierra Co., Cal., where along with the type the writer has observed it almost annually since 1867. It prevails generally in the more northerly parts of the state, and has long been observed and its superior qualities noted by my friend Mr. Sisson, of Strawberry Valley at the base of Mt. Shasta, where it grows plentifully along streams that course through rich meadow lands. Dr. Kellogg described it, though without giving it a varietal name, as early as 1859, in Hutching's Magazine * * * [36].

Since Hutching's Magazine is a somewhat rare publication, it may be of interest to quote what Dr. Kellogg writes concerning this plum:

> It is very probable that many of our readers who dwell in the principal mercantile cities are unaware that in the mountains of this state there are not less than two varieties of a very excellent wild plum. One is almost the size—although we have seen some much larger—and shape of that given in our engraving, the other is a little smaller, oblong, and almost the shape and color of a damson when ripe. This latter variety has not yet been examined and classified by botanists; but if some of our friends who are coming to the city will bring a good specimen with them and leave it with us, we will see that this is done.
>
> Both varieties of this plum grow on low bushes and not on trees like other wild plums at the east, and are about the height and conformation of the illustration given on page 10.
>
> They generally grow in patches or groups, at the heads of ravines, at an altitude seldom less than 2,000 feet above the sea, and mostly in open localities adjacent to

LEAVES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—III: 1, PRUNUS HORTULANA; 2, P. REVERCHONII; 3, P. RIVULARIS.

(Natural size.)



LEAVES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—IV: 1, PRUNUS MUNSONIANA; 2, P. ANGUSTIFOLIA; 3, P. ORTHOSEPALA.

(Natural size.)

pine forests, but not directly in it. The bushes are found near to each other, and the two varieties frequently grow in the same group, though not from the same root.

Both are excellent edibles, although those that are round are the first ripe and better, eaten as fruit or stewed as sauce, and preferred by some palates; but when the oblong plum is thoroughly ripe, its rich acetous flavor, in our estimation, far excels the other and makes a delicious preserve.

Just before the fruit is fit for use, a large proportion of its leaves drop off, when, by drawing the hand up the small twiglike boughs, an immense quantity can be gathered in a brief space of time.

For some unexplained reason, like the coffee tree of northwestern Mexico, they do not always bear fruit two years successively.

These wild plums could be cultivated to advantage in our gardens and would make a pleasing variety of fruit in our markets; and for grafting purposes, might be more hardy and serviceable than the other, as best adapted to their native soil and climate, especially in a mountainous region.

The differences described for this subspecies are variations that occur in practically all the species of the genus and are horticultural rather than botanical in their nature. A careful study in the field also failed to reveal any characters by which a distinct form might be distinguished.

PRUNUS SUBCORDATA HYBRID.

A variety named Glow, recently originated by Luther Burbank, is described by the originator as a combination of *Prunus triflora*, *P. maritima*, *P. americana*, *P. subcordata*, and *P. nigra*.

PRUNUS SUBCORDATA OREGANA (Greene) W. F. Wight.

Prunus oregana Greene, 1896, *in* Pittonia, v. 3, pt. 15, p. 21.

Leaves oval or ovate, about 3 cm. long, pubescent, at least on the lower surface; fruit pubescent even when mature, otherwise similar to the species.

Originally described from specimens collected in 1893 on the Klamath Indian Reservation, in southeastern Oregon, it has since been collected near Klamath Falls and in the Sprague River Valley. Since this differs from *Prunus subcordata* only in the fruit being more or less covered with pubescence, it is not considered worthy of specific rank.

PRUNUS HORTULANA Bailey.

Prunus hortulana Bailey, 1892, *in* Gard. and Forest, v. 5, p. 90.
Prunus hortulana waylandi Bailey, 1901, Cycl. Amer. Hort., v. 3, p. 1450.

Leaves oblong-obovate acuminate (Pl. III, fig. 1) to oblong-oval or oblong and acuminate, rarely oblong-lanceolate, mostly 7.5 to 11 cm. long, 2.5 to 4.5 cm. broad, usually rather abruptly rounded at the base, yellowish green, glabrous and somewhat lustrous above, pale green and pubescent below, with tawny hairs at least along the midrib and lateral veins, the pubescence usually tufted in the

axils of the lateral veins often rather densely hairy when very young, serrations rounded or almost crenate, glandular; petioles mostly 1.5 to 2.5 cm. long, pubescent on the upper surface, usually with one or more glands toward the apex; stipules linear and glandular serrate. Flowers appearing from the first of April in southern Missouri to the middle of May in northern localities, in umbels of 2 to 4 or rarely 5, about 12 to 15 mm. broad; pedicels glabrous, slender, 9 to 12 or sometimes even 14 mm. long; calyx campanulate, the tube about 3 mm. long, obscurely ribbed, and glabrous, the lobes nearly or quite as long as the tube and oblong-ovate, glabrous or sometimes obscurely pubescent, glandular on the margin, mostly obtuse at the apex, pubescent within mainly toward the base, and usually reflexed in age; petals 6 to 8 mm. long, oval or oblong-orbicular, usually rather abruptly narrowed to a claw. Fruit ripening late in July under cultivation in Texas, in September in Missouri, and often in October in northern localities, globose or rarely slightly ellipsoid in wild specimens, 18 to 25 mm. in diameter, or in the ellipsoid forms 30 mm. long, varying in color from red to yellow and usually marked with whitish dots, bloom thin or wanting, flesh firm; stone extremely variable (Pl. X, figs. 1 to 12), ranging from nearly globose,[1] 11 by 9 by 7 mm., to oval or oblong, 17 by 11 by 7.5 mm., pointed or narrowed and truncate at the base, pointed or sometimes rounded at the apex, the ventral edge usually rather sharp, variously grooved and sometimes ridged on either side, grooved along the dorsal edge, the surface reticulated or rarely obscurely so.

The tree grows singly or in groves and attains a maximum height in the region of its greatest perfection of about 25 or 30 feet; bark of the trunk rather thin, exfoliating in platelike scales, dark brown, the inner layers reddish; young twigs at time of flowering rather dark reddish brown or chestnut colored, sometimes with grayish blotches. In the character of foliage, in the shape of fruit and stone, and in the time of ripening *Prunus hortulana* bears some resemblance to *P. reverchonii*, but it does not sucker as that species does in its natural state and apparently never forms a thicket.

Prunus hortulana ranges (fig. 2) from central Kentucky and northwestern Tennessee westward to northeastern Oklahoma and eastern Kansas and northward through Missouri and western Illinois, reaching its northernmost limit in Scott County, Iowa. It is most abundant and apparently reaches its greatest size in Missouri.

Prunus hortulana was originally described from cultivated material, being based on the varieties "Golden Beauty, Cumberland, Garfield, Sucker State, Honey Drop, probably Wild Goose, and others."

[1] The globose form of the stone is represented among cultivated varieties by Reed, and the oval or oblong form by Golden Beauty, Wayland, and World Beater, with various intermediate shapes in other varieties as well as in wild material.

All of the varieties named, with the exception of the last one, are of the "Wayland group" and the name *hortulana* must in consequence be retained in its original application. Wild goose belongs to a distinct species, very different in habit and in some other characters from any of the other varieties named in the original description. The species varies greatly in the size and quality of its fruit, and when it receives the attention it deserves by those engaged in the improvement of American fruits it will undoubtedly occupy a more prominent place in American pomology than at present. In its most perfect development it is probably the most symmetrical in form of any of the native species. Its vigor, nonsuckering habit, and abundant

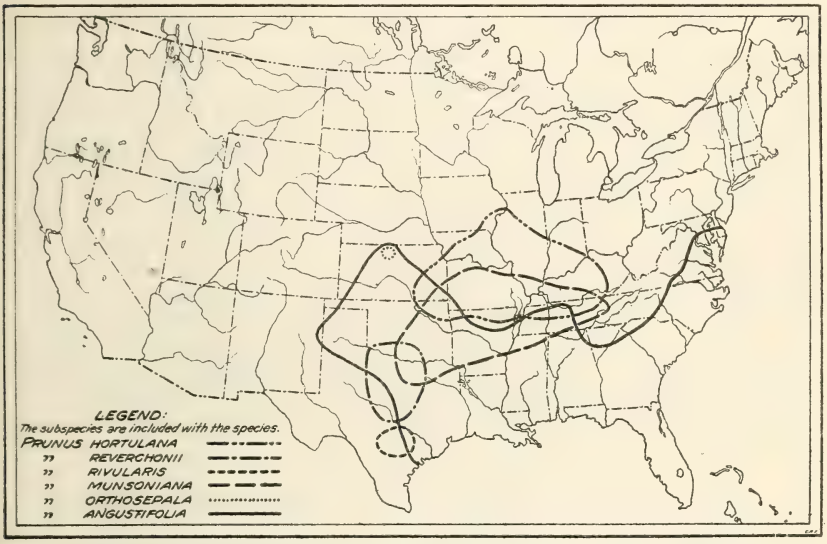


FIG. 2.—Outline map of the United States, showing the distribution of native American species of Prunus: *Hortulana, reverchonii, rivularis, munsoniana, orthosepala,* and *angustifolia.*

fruiting qualities commend it as a stock where sufficiently hardy, as well as for a fruit-producing tree. The Crimson Beauty, Cumberland, Garfield, Golden Beauty, Kanawha, Leptune, Moreman, Reed, and Wayland varieties belong to this species. Among these varieties Golden Beauty is supposed to have been found wild far beyond the natural range of the species in the Southwest. It was introduced in 1874 by Gilbert Onderdonk, of Nursery, Tex. Mr. Onderdonk writes the following under date of February 1, 1911:

The German whose name I have lost ran off from Gonzales County to the then Indian frontier in the region of Fort Belknap. He did so to avoid conscription into the Confederate Army. I can have no idea that he went up into Oklahoma. There was then exemption from conscription in the Indian frontier counties. When the war was over he returned to Gonzales County, bringing with him cuttings of a plum that he called "Late Yellow Chickasaw," and said that he found it wild not far from Fort Belknap. That is all we know about its origin.

"Fort Belknap," now known as Belknap, is on the Brazos River, in Young County, northern Texas. Another variety, material of which has not been seen but which is referred to this group by Waugh (76, p. 181), is reported to have been found by Dan Irby, of Texas, "growing on the grounds of an old Indian settlement in his vicinity." Crimson Beauty, likewise reported to be of Texas origin, probably came from cultivated material. The introducer, A. L. Bruce, writes that it came from trees in Grayson County, growing in ground "being used as a home garden." The variety Captain was introduced about 1892 by A. M. Ramsey & Son, of Austin, Tex., under the name Columbia. Mr. Ramsey obtained it from J. M. Shell, of Georgetown, Tex., and Mr. Shell writes that he in turn received the variety from Mr. Berckmans, of Augusta, Ga., as Cumberland, and sold it as such. It is evident that the name Columbia originated by an error either in writing or reading the label intended for Cumberland. Later the name Columbia was changed to Captain to avoid confusion with a *domestica* variety. While perhaps it may be difficult to furnish definite proof, it is nevertheless extremely probable that these varieties were all originally carried to Texas from the region of the known natural range of the species, either by the Indians or by the early settlers.

Prunus Hortulana Hybrids.

Among the cultivated varieties are a few supposed to represent hybrids of *Prunus hortulana* with *P. triflora*, *P. americana*, *P. munsoniana*, and *P. hortulana mineri*.

Prunus Hortulana Mineri Bailey.

Prunus hortulana mineri Bailey, 1892, N. Y. Cornell Agr. Exp. Sta. Bul. 38, p. 23.

A form differing in botanical characters but little from the species. The bark of the trunk in mature trees shows a slight approach to the scaly character of that of *Prunus americana*. The branches are perhaps somewhat more rigid than in the species and the foliage is a darker green. This form blooms a few days earlier and the fruit also ripens earlier. It is, however, impossible to distinguish *mineri* from the species in herbarium material.

The "Miner group" is a group well recognized by pomologists, but careful study both in the herbarium and in the field fails to reveal any distinctive characters other than as indicated above. It is usually contrasted by pomologists with the "Wild Goose group," *Prunus munsoniana*, or with *P. americana*, but not with the "Wayland group," *P. hortulana*, to which it is clearly most closely related. The varieties referred to this form have mostly originated under cultivation and would therefore not be expected to show the intergradation with the species that is found in a number of specimens from a

wild state, yet a study of several of the varieties referred to this group by pomologists reveals no botanical character of consequence. The suggestion sometimes made that these varieties are hybrids of *Prunus hortulana* with *P. americana* is without foundation and has probably arisen from a misunderstanding of the specific differences.

While *Prunus hortulana* is one of the most recent to receive botanical recognition, this form of the species enjoys the distinction of being apparently the first in which a horticultural variety has been given a name in a publication. This naming of a variety is a noteworthy event in the development of American plums, and what is known concerning the history of this variety has been related earlier in this discussion. If Dodd, who is credited as being the one who planted seed from which the Miner came, really had two lots of plum seeds, as may perhaps be inferred from Mr. Giddings's account previously quoted, it is not clear which was the origin of the Miner or whether it was the one obtained from the Horseshoe Bend of Tallapoosa River. This locality is in the northern part of Tallapoosa County, Ala., and is about 150 miles south of the known range of the species.

Prunus Hortulana Mineri Hybrids.

The *mineri* form of *Prunus hortulana* is supposed to have been hybridized with *Prunus americana* (Pl. XIII, fig. 6, Surprise; figs. 7, 8, Hammer), *P. munsoniana*, and *P. pumila*.

Prunus Reverchonii Sargent.

(Hog plum.)

Prunus reverchonii Sarg., 1911, Trees and Shrubs, v. 2, pt. 3, p. 158.
Prunus pygma Munson, 1889, *in* Amer. Gard. v. 10, no. 5, p. 175. (Not *P. pygmaea* Willd., 1796.)

Leaves lanceolate to ovate-lanceolate and acuminate (Pl. III, fig. 2), usually strongly conduplicate or troughlike and folding at the base when pressed, mostly 5 to 7 cm. long, 2 to 3.5 cm. broad, or those of the young shoots sometimes 9.5 cm. long and 4.5 cm. broad, rounded or narrowed at the base and acute at the apex, the margin glandular serrate, in age the glands appearing as callous points or falling away and leaving the serrations rounded, green and glabrous above, pale green and pubescent with scattered hairs below, or sometimes rather densely pubescent when young, the pubescence sometimes slightly tufted in the axils of the lateral veins; petioles 7 to 12 mm. long, slightly pubescent along the upper surface and usually with two to four glands near the apex; stipules linear, glandular along the margin. Flowers appearing from the last of March to the middle of April, with or before the leaves, in umbels of 2 to 4 or rarely more, about 10 mm. broad; pedicels 6 to 9 mm. long, glabrous;

calyx campanulate, sparingly hairy on the outer surface, the tube about 2 mm. long, the lobes oblong or ovate-oblong and obtuse, 1.5 mm. long, the margin glandular, usually rather strongly pubescent within, at least toward the base, apparently erect or spreading at anthesis; petals obovate to oblong-obovate, 4 to 6 mm. long, 2.5 to 3 mm. broad, narrowed toward the base or sometimes more abruptly contracted to a claw, entire or erose toward the apex. Fruit ripening in August or early September, globose or subglobose, 1.5 to 2 cm. in diameter, usually yellow overlaid with crimson on one side or sometimes golden yellow with whitish dots, rarely entirely red, bloom thin or wanting, flesh yellow and rather firm, quality usually poor, but occasionally good; stone oblong (Pl. X, figs. 13 to 22), 11 by 7 by 5 mm. to 13.5 by 10 by 7 mm., pointed at each end or sometimes somewhat truncate at the base and rounded, but with an abrupt point at the apex, irregularly grooved and ridged near the ventral edge, indistinctly grooved along the dorsal edge, the surface smooth or obscurely reticulate.

Prunus reverchonii is a shrub usually 2 to 6 feet high; the bark of the stem is gray, while that of the young twigs is chestnut or dull reddish chestnut, turning to a dull gray the second year, or rarely becoming grayish the first year; lenticels small, round, and lighter colored.

The species (fig. 2) forms very dense thickets on the black upland soils and in the rich bottom lands along streams from Limestone Gap and the vicinity of the False Washita in southern Oklahoma southward to the Colorado in Texas. It probably does not occur east of the ninety-sixth meridian, but its western limits are not known. It has been collected along the Little Wichita, in Clay County, on hills near the Concho River, and in Lampasas County. Foliage closely resembling this has also been collected in the vicinity of Fort Davis, in western Texas, but without flowers or fruit the specimen can not be definitely referred to this species.

Prunus reverchonii is closely related to *P. rivularis* and is sometimes difficult to distinguish in the herbarium from that species. Additional material and study in the field may require it to be ranked as a subspecies of the latter. The apparent differences are its more branching and less slender stems, trough-shaped leaves, later ripening fruit, and more pointed stone. It is generally regarded as of little value horticulturally, but its adaptability to limestone soils and ability to withstand severe drought may make it of value as a dwarf stock, if its habit of suckering is not too great an objection. The small stone and the fact that occasional thickets are found producing fruit of fair quality suggest also that the fruit should not be entirely neglected. One thicket on the Little Wichita River, west of Henrietta, Tex.,

produced fruit identical in color with the variety Golden Beauty of *Prunus hortulana*. This fruit was of good quality and was remarkable in having the smallest stone of any specimen found, being about 9 by 6 by 5 mm. The stone is slightly less pointed than usual, but no other distinguishing differences were found. The species is used locally in Texas for jellies and preserves.

Prunus Reverchonii Hybrid.

A form found near Henrietta, Tex., and referred to under *Prunus mexicana*, is apparently a hybrid. It may be characterized as follows: Leaves ovate or sometimes nearly oval and acuminate, mostly 4.5 to 7 cm. long, 2.5 to 3.5 cm. broad, gradually narrowed at the base, acuminate toward the apex, sometimes abruptly so, dull green and glabrous or nearly so above, pale and sparingly soft-pubescent below, the margins serrate, the serrations acute or often somewhat obtuse, sometimes glandular, at least when young; petioles 7 to 10 mm. long, hairy, and usually with one or more glands toward the apex. Flowers appearing before the leaves, about 12 mm. broad, in umbels of 2 to 4, umbels short stalked, the stalk sometimes 3 mm. long; pedicels slender and glabrous, 8 to 10 mm. long; calyx rather narrowly campanulate, glabrous or sparingly and obscurely pubescent, the tube about 3 mm. long, the lobes ovate, 2 mm. long, glandular, and hairy within; petals oblong-orbicular and narrowed to a claw, about 5 mm. long.

The hybrid is a small tree with the young twigs chestnut colored, later becoming grayish; lenticels oval, not very prominent, and the branches apparently without thorns. In texture of leaf it resembles *Prunus mexicana*, but the shape of the leaf suggests that of *P. reverchonii*, and it resembles the latter also in the size of flowers and in its calyx characters. One form, apparently a hybrid, also originating near Henrietta, was for a time under cultivation in the nursery of A. M. Ramsey, at Austin, Tex., and by some other firms under the name of Ward's October Red. Mr. Ramsey grew a number of seedlings and these showed great variation; none of them, however, produced fruit of merit, and the trees were destroyed in 1910.

Prunus Rivularis Scheele.

(Creek plum.)

Prunus rivularis Scheele, 1848, *in* Linnæa, Bd. 21, Heft 5, p. 594.
Prunus texana Scheele, 1848, *in* Linnæa, Bd. 21, Heft 5, p. 593. (Not Dietrich, 1843.)

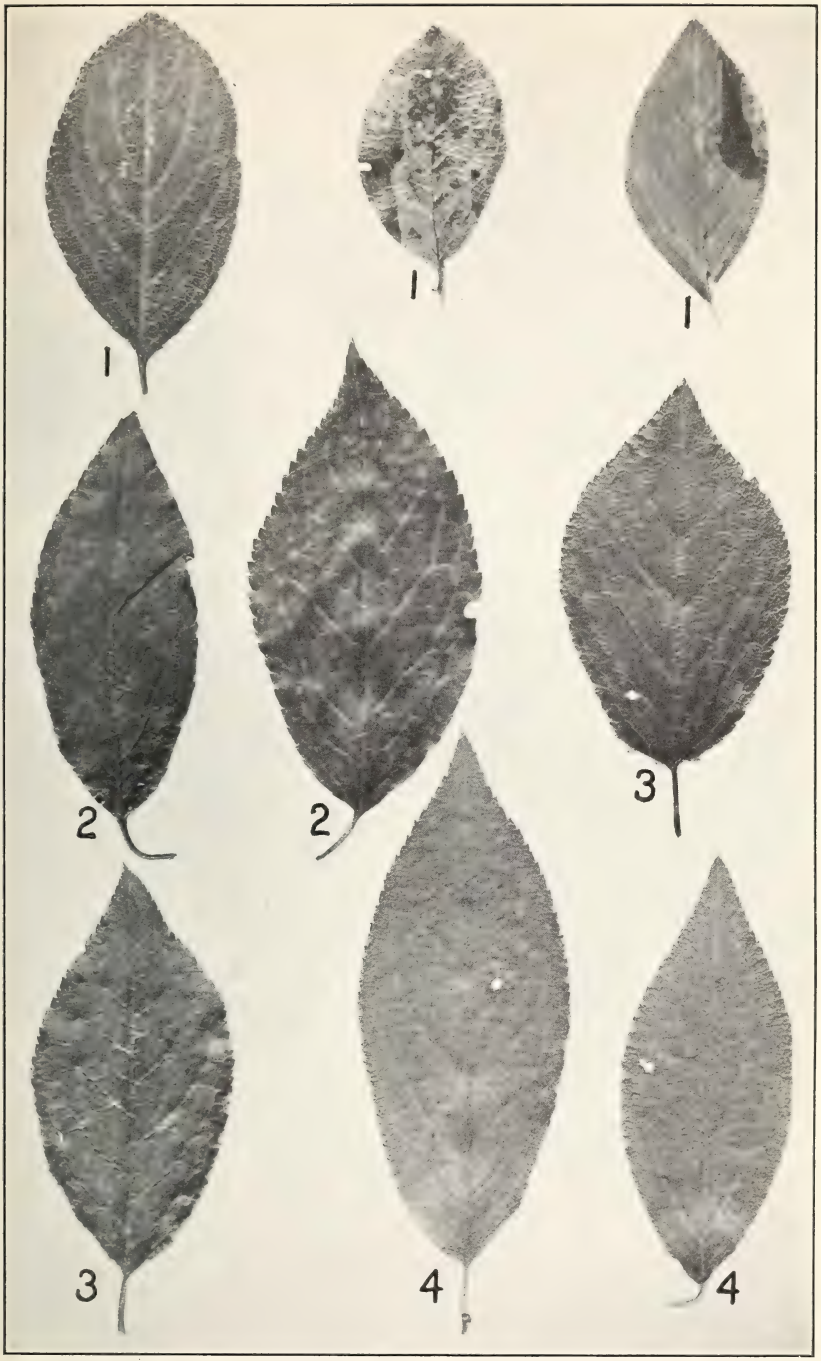
Leaves ovate to oblong-ovate (Pl. III, fig. 3) or sometimes slightly obovate, rounded at the base, usually short acuminate, 6 to 7.5 cm. long, 2 to 4 cm. broad, usually not folding at the base when

pressed, glandular serrate, the glands remaining as callous points, glabrous and green above, pale green and pubescent with scattered hairs below or rather densely pubescent when young, the pubescence rarely or not at all tufted in the axils of the lateral veins; petioles 10 to 12 mm. long, glandless or with one or two glands near the apex, pubescent along the upper edge; stipules linear or lobed, glandular. Flowers appearing in February or March, with or before the leaves, in umbels of 2 to 4 or rarely 5, about 9 or 10 mm. broad; pedicels 6 to 8 mm. long, slender, glabrous; calyx campanulate, the tube glabrous, about 2 mm. long, the lobes as long as the tube and ovate or oblong-ovate, usually pointed at the apex, glandular, obscurely pubescent on the outside, pubescent on the inner surface toward the base, and reflexed in age; petals 4 to 4.5 mm. or rarely 5 mm. long, 2.5 mm. broad, obovate-orbicular, or rarely oblong-obovate, narrowed to a very short claw. Fruit ripening in June, subglobose, about 15 mm. in diameter, red with a light bloom; stone oval to nearly globose (Pl. X, figs. 23 and 24), 9 to 12 mm. long, 7 to 9 mm. broad, 6 to 7 mm. thick, rounded or slightly pointed at the apex and rounded or obliquely truncate at the base, irregularly grooved along the vertical edge, the dorsal edge inconspicuously grooved or sometimes smooth, surface obscurely rugose.

The species is a shrub 3 to 8 feet high with slender stems, forming open thickets. The bark of the stems is gray, that of the young twigs grayish or rarely somewhat reddish or pale chestnut in color, obscurely marked with oval lenticels; winter buds small.

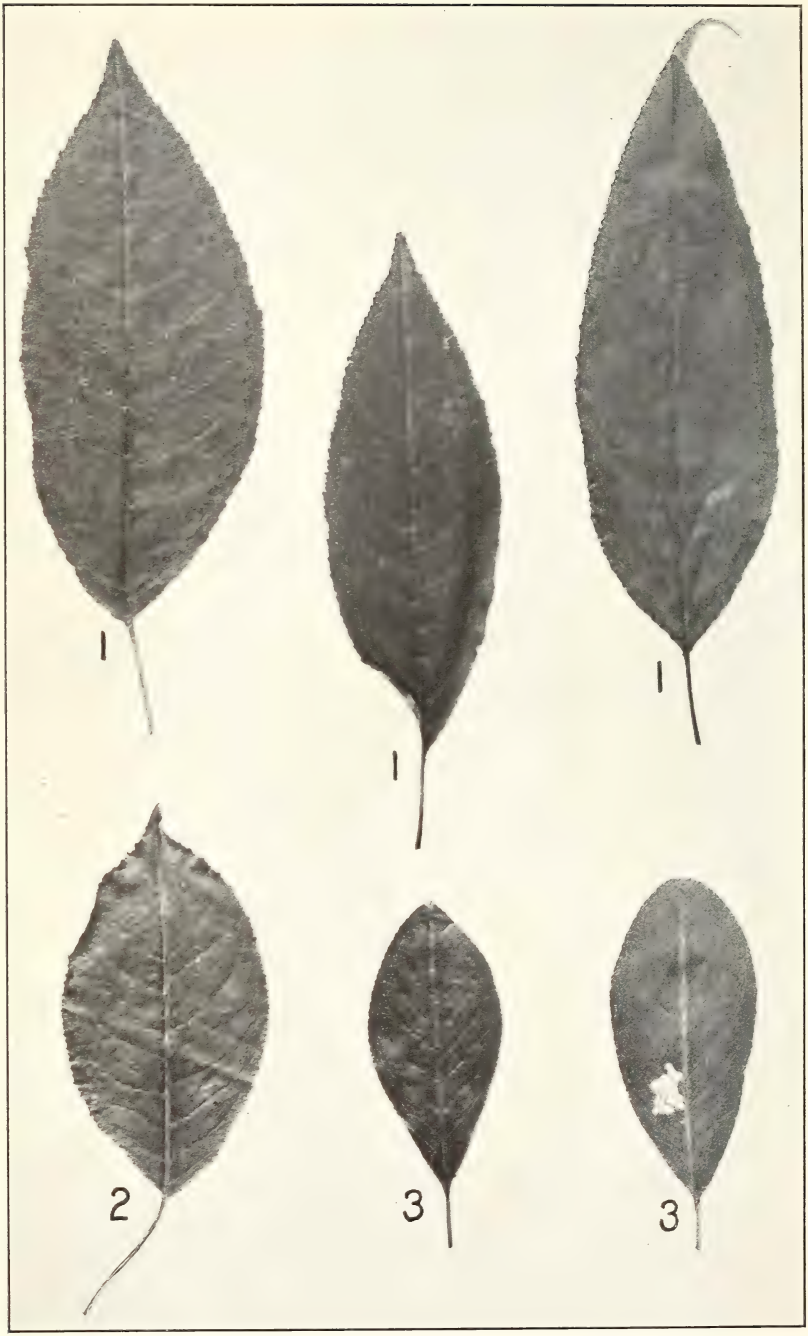
Prunus rivularis occurs (fig. 2) in bottom lands along streams in Texas from the Rio Blanco, in Hays County, to San Antonio. It is apparently not very abundant.

The species was originally described from a specimen collected by Lindheimer, but neither the date nor locality are cited by Scheele. Among the seven specimens in the herbarium of the Missouri Botanical Garden collected by Lindheimer, one (No. 274, 1846) has a label with the same data that are given by Scheele and is apparently a duplicate of the type. On the same sheet is a package of stones labeled "New Braunfels, Texas, 1846, Lindheimer," and there can be little doubt that this is the type locality. *Prunus texana* was described from material collected by Roemer at New Braunfels, and a flowering specimen of his in the herbarium of the Missouri Botanical Garden, "*Prunus texana* Scheele," bears the legend "Scheele misit" and is evidently part of the type material. It does not differ from *P. rivularis*. The Indians, according to Lindheimer, gathered these plums and cooked them with honey, but the fruit is small, poor in quality, and the species apparently has little value in horticulture.



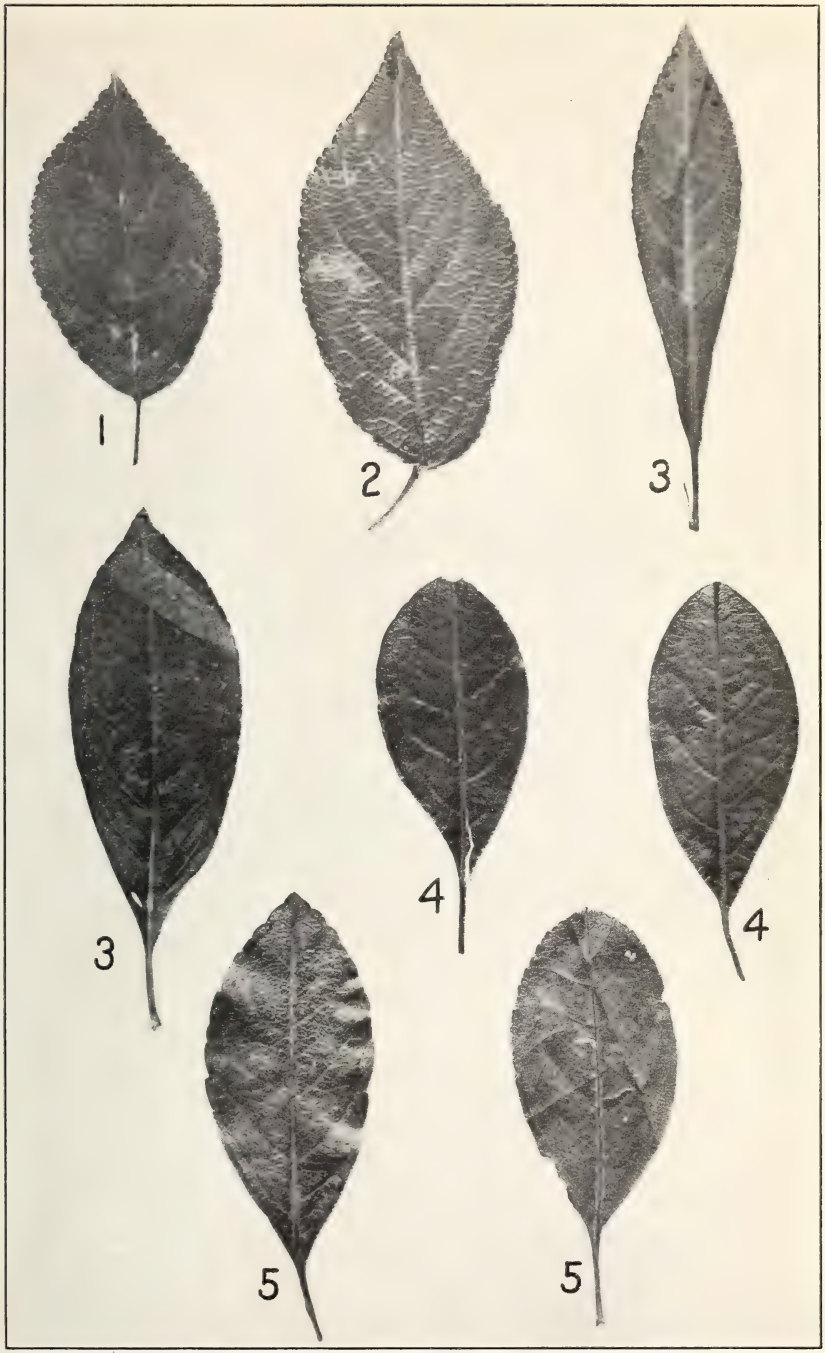
LEAVES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—V: 1, PRUNUS MARITIMA; 2, P. ALLEGHANIENSIS; 3, P. ALLEGHANIENSIS DAVISII; 4, P. UMBELLATA.

(Natural size.)



LEAVES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—VI: 1, PRUNUS PENNSYLVANICA; 2, P. PENNSYLVANICA CORYMBOSA; 3, P. EMARGINATA.

(Natural size.)



LEAVES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—VII: 1, PRUNUS GRACILIS; 2, P. VENULOSA; 3, P. PUMILA; 4, P. CUNEATA; 5, P. BESSEYI.

(Natural size.)

PRUNUS MUNSONIANA Wight and Hedrick.

Prunus munsoniana Wight and Hedrick, 1911, *in* Hedrick, Plums of New York, p. 88.

Prunus hortulana Bailey, in part, 1892, N. Y. Cornell Agr. Exp. Sta. Bul. 38, p. 16.

Prunus hortulana Waugh, 1899, *in* Vt. Agr. Exp. Sta. 12th Ann. Rpt., p. 195. (Not *P. hortulana* Bailey, 1892, *in* Gard. and Forest, v. 5, p. 90.)

Leaves lanceolate to oblong-lanceolate (Pl. IV, fig. 1), or sometimes broadly oblong-lanceolate, usually 6 to 10 cm. long, 2.5 to 4 cm. broad, rounded at the base, acute or occasionally somewhat acuminate at the apex, the margins rather finely glandular serrate, bright green and lustrous on the upper surface, the lower surface paler and rather sparingly pubescent along the midrib and lateral veins, the pubescence often tufted in the axils of the veins, the surface rarely pubescent except when young, and even more rarely entirely glabrous; petioles slender, 1.5 to 2 cm. long, with a pubescent line along the upper side, usually biglandular near the base of the leaf blade; stipules linear, glandular serrate. Flowers 12 to 15 mm. in diameter, appearing from the last of March before the leaves in the South to the last of May and with the leaves in the North (latitude of New York), in 2 to 4 flowered, umbellike clusters; pedicels slender, glabrous, 10 to 12 mm. long; calyx tube campanulate, glabrous, obscurely nerved, about 3 mm. long, the lobes ovate-oblong to oblong and obtuse at the apex, as long as the tube, glandular on the margin, glabrous or rarely sparingly pubescent on the outer surface, pubescent on the inner surface near the base, or the pubescence rarely extending above the middle, the margin usually ciliate toward the base; petals 6 to 7 mm. long, obovate or oblong-obovate, abruptly contracted into a short claw, the margin entire or sparingly erose. Fruit globose or oval, usually bright red with whitish dots and sometimes yellowish markings and a light bloom, ripening in July and August; stone oval (Pl. XI, figs. 1 to 16), varying from 9 by 13 mm. in the wild state to 12 by 20 mm., or even 14 by 20 mm. in some of the cultivated varieties, usually truncate or obliquely truncate at the base, pointed at the apex, grooved on the dorsal edge, thick margined and rather conspicuously grooved on the ventral, the surface irregularly roughened, though sometimes rather inconspicuously so.

The species forms dense thickets in its native habitat with the older central specimens sometimes attaining a height of 20 or more feet and gradually diminishing in height to the edge of the thicket. When budded and grown in the orchard it forms a well-defined trunk and attains a height of 25 feet or more. The branches are little or not at all spinescent; the bark of the stem in young specimens is reddish or chestnut brown and usually rather smooth, becoming scaly and losing its reddish color with age; that of the young twigs is usually chestnut brown.

Prunus munsoniana is found (fig. 2) in rather rich soils and ranges from central Tennessee and southwestern Kentucky through northern Mississippi, northern and central Arkansas, central Missouri, and southeastern Kansas to the valley of the Little Wichita River, in northern Texas.

Although *Prunus munsoniana* is the last species prominent in horticulture to receive specific botanical recognition, it embraces horticultural varieties among the earliest, if not the earliest, of any American species to be described. It embraces one or more varieties that are probably the best known and most widely disseminated among those of native origin. There will perhaps be some question among horticulturists concerning the reference of the variety Wild Goose to this species, but a most critical study of specimens of this variety from many localities fails to reveal a single botanical character in which it differs from others. The varieties Arkansas, Clifford, Mrs. Cleveland, Cooper, Downing, Choptank, Davis, Drouth King, Hollister, Hughes, Jewell, Macedonia, Miles, Milton, Newman, Nimon, Ohio, Osage, Poole Pride, Pottawattamie, Robinson, Texas Belle, Thousand and One, Whitaker, Wild Goose, Wonder, and Wooten, all belong to this species. Nearly all of the varieties have until recently been referred to *Prunus angustifolia*, from which the present species is distinguished by its more vigorous and hardy character, larger and more pointed leaves, larger flowers, and glandular calyx lobes.

Prunus Munsoniana Hybrids.

The originators of new varieties have made many hybrids of *Prunus munsoniana* with other species. Crosses are supposed to have been made with *P. americana*, *P. angustifolia varians*, *P. cerasifera*, (Pl. XIII, figs. 11 and 12, Marianna), *P. hortulana*, *P. hortulana mineri*, *P. triflora*, *P. simonii* [(*munsoniana* × *triflora*) × (*triflora* × *simonii*) and with *Amygdalus persica*.

Prunus Angustifolia Marsh.

(Chickasaw plum.)

Prunus angustifolia Marsh, 1785, Arb. Amer., p. 111.
Prunus chicasa Michx., 1803, Fl. Bor. Amer., t. 1, p. 284.
Prunus stenophyllus Raf., 1817, Fl. Ludov., p. 98.
Cerasus chicasa Ser., 1825, *in* DC. Prodr., pars. 2, p. 538.
Prunus chicasa angustifolia Roem., 1847, Fam. Nat. Sym. Mon., fasc. 3, p. 58.

Leaves (Pl. IV, fig. 2) lanceolate or oval-lanceolate, 2 to 5 cm. long, 1 to 2 cm. broad, usually strongly conduplicate, narrowed or rarely rounded toward the base, acute at the apex or obtuse when they first unfold, the margin finely glandular serrate, glabrous and lustrous

green above, pale below and sparingly pubescent along the midvein toward the base, or sometimes entirely glabrous; petioles 5 to 10 mm. long, usually reddish and pubescent along the upper edge, glandular near the apex or eglandular; stipules linear lanceolate, glandular serrate. Flowers 8 or 9 mm. broad, appearing before the leaves from the middle of February in northern Florida to the first of April in Virginia, in umbels of 2 to 4; pedicels 3 to 6 mm. long, glabrous; calyx tube obconic, glabrous, 2 to 2.5 mm. long, the ovate, obtuse lobes shorter than the tube, glabrous on the outer surface, glabrous within, except near the base, or inner surface sometimes sparingly pubescent, the margin ciliate, eglandular; petals about 4 mm. long, ovate-orbicular or obovate-orbicular, abruptly contracted to a claw. Fruit ripening from the first of June in the South to the middle of July in the northern portion of its range, subglobose, skin thin, flesh yellow, frequently of very good quality; stone oval (Pl. XI, figs 17 and 18), 11 or 12 mm. long, about 10 mm. broad, about 7 mm. thick, obtuse at the base, obtuse or somewhat pointed at the apex, rounded on the ventral edge and usually grooved on either side, grooved along the dorsal edge.

The tree is small, reaching a maximum height of about 10 feet, or more often only a shrub forming dense thickets; the bark of the trunk in the younger stems is dark reddish brown, rather smooth or becoming slightly furrowed in age.

The species ranges (fig. 2) from the Eastern Shore of Maryland and southern Delaware southward in the sandy soils of the coast region to northern and central Florida and westward through Mississippi, Louisiana, and southern Arkansas to central Texas. Specimens referable to this species have also been collected in western Kentucky and Tennessee, but its occurrence in the former, at least as an indigenous species, is to be doubted.

Prunus angustifolia was described by Marshall, but no locality was given other than "the Southern States." The specimen in the Michaux herbarium in the Muséum d'Histoire Naturelle labeled *Prunus chicasa* is not this species and has not been definitely identified. The description, however, can refer to no other plant. Rafinesque's *Prunus stenophyllus* described as being from "near Washita," in southern Arkansas, can not be other than this species. Rafinesque, who evidently did not see specimens, based his species on *Cerasus canadensis* Robin (65, p. 495; not Miller, 1768).

Prunus angustifolia is much less important horticulturally than either of its subspecies, and among the cultivated varieties studied few, among which are Ogeeche and Caddo Chief, can be referred to it. The fruit is small, and it is probably less hardy than either of its subspecies.

Prunus Angustifolia Hybrids.

The early ripening of the fruit of *Prunus angustifolia* has caused it to be used in hybridizing with *P. triflora* (Pl. XIII, fig. 13, Six Weeks) with which it crosses very readily, and it is supposed also to be one of the species used in producing the variety Chicrigland. This is said to be a combination of *P. angustifolia, P. reverchonii,* and *P. texana* (*P. glandulosa* (Hook.) Torr. and Gray).

Prunus Angustifolia Watsoni (Sargent) Waugh.

(Sand plum.)

Prunus watsoni Sarg., 1894, in Gard. and Forest, v. 7, p. 134, f. 25.
Prunus angustifolia watsoni Waugh, 1899, *in* Vt. Agr. Exp. Sta., 12th Ann. Rpt., 239.

Leaves oval or oblong-oval, 3 to 4.5 cm. long, 12 to 18 mm. broad, gradually narrowed toward the base, usually acute at the apex, sometimes abruptly so, lustrous above, pale and glabrous below or sometimes a few scattered hairs along the midrib toward the base, the margin finely crenate and glandular; petioles slender, 6 to 18 mm. long, glabrous, or sometimes pubescent along the upper edge. Flowers appearing in Kansas from the last of March to about April 20, sometimes with red anthers, otherwise not differing from the species. Fruit very similar to the species, but ripening from the first of August to the first of October, or in the Panhandle region early in July; stone oval or rarely obovoid, about 13 or 14 mm. long, 9 mm. broad, 7 mm. thick, truncate or oblique at the base, rounded or pointed at the apex, variously grooved on either side of the ventral edge or the grooves very obscure but without a winglike margin, grooved along the dorsal edge, prolonged at the base when obovoid.

Prunus angustifolia watsoni is usually a shrub 3 to 6 feet high with rather stiff branches, these often furnished with spinescent branchlets.

The subspecies was originally described from garden specimens grown from seed sent from Ellis, Kans., by Dr. Louis Watson. It ranges from northeastern Kansas southwestward through Oklahoma and the Panhandle region of Texas to the vicinity of Nara Visa, Quay County, in northeastern New Mexico. Its eastern boundary is not well defined, but no specimens have been observed east of a line drawn from the northeastern part of Kansas southwestward to the junction of the North Fork of Red River with the main stream, yet it doubtless occurs somewhat farther east. It does not appear to have been collected much west of Ellis and Seward Counties, in Kansas. It has several times been reported from southeastern Nebraska, but no specimens are to be found in the larger herbaria from that region, and it probably occurs in Nebraska only under cultivation.

Prunus angustifolia watsoni is very difficult to distinguish from the species in the herbarium, but the leaves appear to be less pointed, slightly less minutely serrate, and the serrations less deep in proportion to their length, with the glands less often near the center of the teeth but frequently even in the lowest part of the indentation. In the field, the form usually appears even more shrubby, the branches more zigzag, and the fruit usually ripens later. A few specimens from southwestern Kansas and one from New Mexico are unusually pubescent, but they do not differ otherwise.

The fruit is often gathered in considerable quantities in many localities and is sometimes sold in the markets. This form is also sometimes grown in small orchards in Kansas. Among the named varieties which appear to belong to the subspecies, Purple Panhandle, Red Panhandle, Yellow Panhandle, and Quitique have come from the Panhandle region of Texas. Other varieties are Strawberry and Welcome. These plums are said to appear promising in their native region, but they proved disappointing when brought to Austin, Tex., where some of them were introduced to the trade. Nevertheless, the form should not be lost sight of in any comprehensive effort to improve the native species.

Prunus Angustifolia Watsoni Hybrids.

There is little doubt that the form known as the Utah hybrid, × *Prunus utahensis* has this subspecies for one of its parents. It is also supposed to hybridize with *P. americana*, and these hybrids are discussed under *P. besseyi* and *P. orthosepala*, respectively.

Prunus Angustifolia Varians Wight and Hedrick.

Prunus angustifolia varians Wight and Hedrick, *in* Hedrick, 1911, The Plums of New York, p. 87.

Leaves oblong-oval, oval-lanceolate, or rarely slightly obovate-lanceolate, mostly 3.5 to 6 cm. long, 2 to 2.5 cm. broad, gradually narrowed at the base, acute at the apex, the margin very minutely glandular serrate, glabrous and somewhat lustrous above, slightly pale, glabrous or sparingly hairy along the midrib and in the axils of the lateral veins on the lower surface; the slender petioles usually reddish, 10 to 15 mm. long, pubescent along the upper side, eglandular or sometimes with one or two glands at the apex; stipules 3 to 4 mm. long, linear, and glandular dentate. Flowers, appearing from early in March and before the leaves in the South to the middle of April and with the leaves in the North, in dried specimens 10 to 12 mm. broad; pedicels 7 to 9 mm. long, glabrous; calyx campanulate, the tube 2 to 2.5 mm. long, glabrous, the lobes usually shorter than the tube, oblong and obtuse, glabrous on the outer surface, glabrous or sometimes sparingly pubescent on the inner, the margin ciliate, eglandular;

petals about 5 mm. long, obovate and gradually narrowed toward the base, erose or entire toward the apex. Fruit mostly ripening in June in its native region, globose or subglobose, varying from red to yellow, usually with a light bloom; stone 13 to 16 mm. long, 9 to 12 mm. broad, turgid, ovoid to elliptic oblong, obscurely pointed at the apex or sometimes slightly obtuse, truncate or obliquely truncate at the base, grooved on the dorsal edge, the ventral edge with a narrow, thickened, and slightly grooved wing, the surface irregularly roughened.

In its native state *Prunus angustifolia varians* forms dense thickets, as does the species, the larger specimens attaining a height of about 11 feet. When budded and grown in the orchard it assumes the form of a small tree with well-defined trunk and spreading branches, sometimes armed with rather slender spinescent branchlets. It is distinguished from the species by its usually more robust habit, by having the young twigs less reddish and approaching chestnut brown in color, by rather longer leaves and longer pediceled flowers, and by the stone usually being more pointed at the apex.

Prunus angustifolia varians usually grows in more fertile soil than the species. It occurs locally from southern Oklahoma through eastern Texas southward, possibly to the Colorado River, and probably westward nearly to the Panhandle region. As yet, however, its distribution is not well defined.

Prunus angustifolia varians embraces nearly all of the early-ripening horticultural varieties previously referred to *P. angustifolia*, and its fruit appears to be superior to that of the species. Among the varieties typical of the form may be mentioned African, Clark, Cluck, Coletta, Emerson, Fawn, Mason, Piram, and Yellow Transparent.

Prunus Angustifolia Varians Hybrids.

The subspecies *Prunus angustifolia varians* has apparently been crossed with *P. munsoniana* and *P. triflora*, and the variety Marianna (Pl. XIII, figs. 11 and 12) may represent a hybrid either of this form or of *P. angustifolia* with *P. cerasifera*. Since its introduction the parentage of the Marianna has remained in doubt, and even now its origin is not clear. The history of the variety is given by G. Onderdonk (58, p. 28), the well-known nurseryman of southern Texas, as follows:

> It was an accidental seedling on the grounds of Mr. C. G. Fitze, at Marianna, Polk County, Tex. Cuttings were furnished Mr. C. N. Ely in 1877. He named it Marianna, after the locality of its origin, and introduced it to the public.

Mr. Ely lived at Smith Point, Tex., and introduced the variety in 1884 (5, p. 213). It has sometimes been considered a hybrid of *Prunus cerasifera* with the Wild Goose, *P. munsoniana*, and these species may

represent its parentage. Nevertheless, the close resemblance to *P. angustifolia* in some of the flower characters, particularly the calyx lobes, which are entirely without glands, suggests either that species or *P. angustifolia varians* as one of the parents. A hybrid of the Wild Goose and *P. cerasifera* might also be expected to produce a form with larger and longer leaves than the Marianna.

Prunus Orthosepala Koehne.

Prunus orthosepala Koehne, 1893, Deut. Dendrol., p. 311.

Leaves (Pl. IV, fig. 3) varying from oblong-lanceolate to obovate-lanceolate, mostly 4 to 6 cm. long, 1 to 2.5 cm. broad, narrowed at the base and acute or acuminate at the apex, the margins serrate with acute or more often slightly obtuse teeth, these occasionally tipped with a callous point, bright green, glabrous, and somewhat lustrous on the upper surface, pale green and glabrous or with a few scattered hairs along the rather prominent midvein; petioles 8 to 15 mm. long, puberulous along the upper surface and eglandular or with one or two glands near the upper end. Flowers appearing the last of April or early in May, 10 to 14 mm. broad in 3 to 4 flowered umbels; pedicels 3 to 5 mm. long, glabrous; calyx tube campanulate, 2 to 2.5 mm. long, glabrous, the oblong obtuse lobes about 2 mm. long, glabrous or nearly so on the outer surface, ciliate on the margin and sparingly pubescent within, dentate or entire at the apex; petals oblong-obovate, 4 to 5 mm. long, 2.5 to 3 mm. broad, entire or erose at the apex, white, or in age with a distinct pinkish tinge. Fruit ripening at the Arnold Arboretum about the middle of September, globose, about 2.5 cm. in diameter, red with white dots, and covered with bloom; stone oval (Pl. XIII, fig. 1), about 15 mm. long, 12 mm. broad, slightly pointed at the base and rounded at the apex, rather irregularly grooved near the ventral suture, grooved along the dorsal edge, and the surface obscurely rugose.

Prunus orthosepala, as it grows in the few American arboreta where it is cultivated, is a much-branched, spreading shrub about 5 feet high. The bark of the stem and larger branches separates in platelike scales; that of the smaller branches is dark brown in color, marked with lighter colored lenticels, while that of the young branchlets is chestnut colored.

The history of this species, as given by Sargent (67), is as follows:

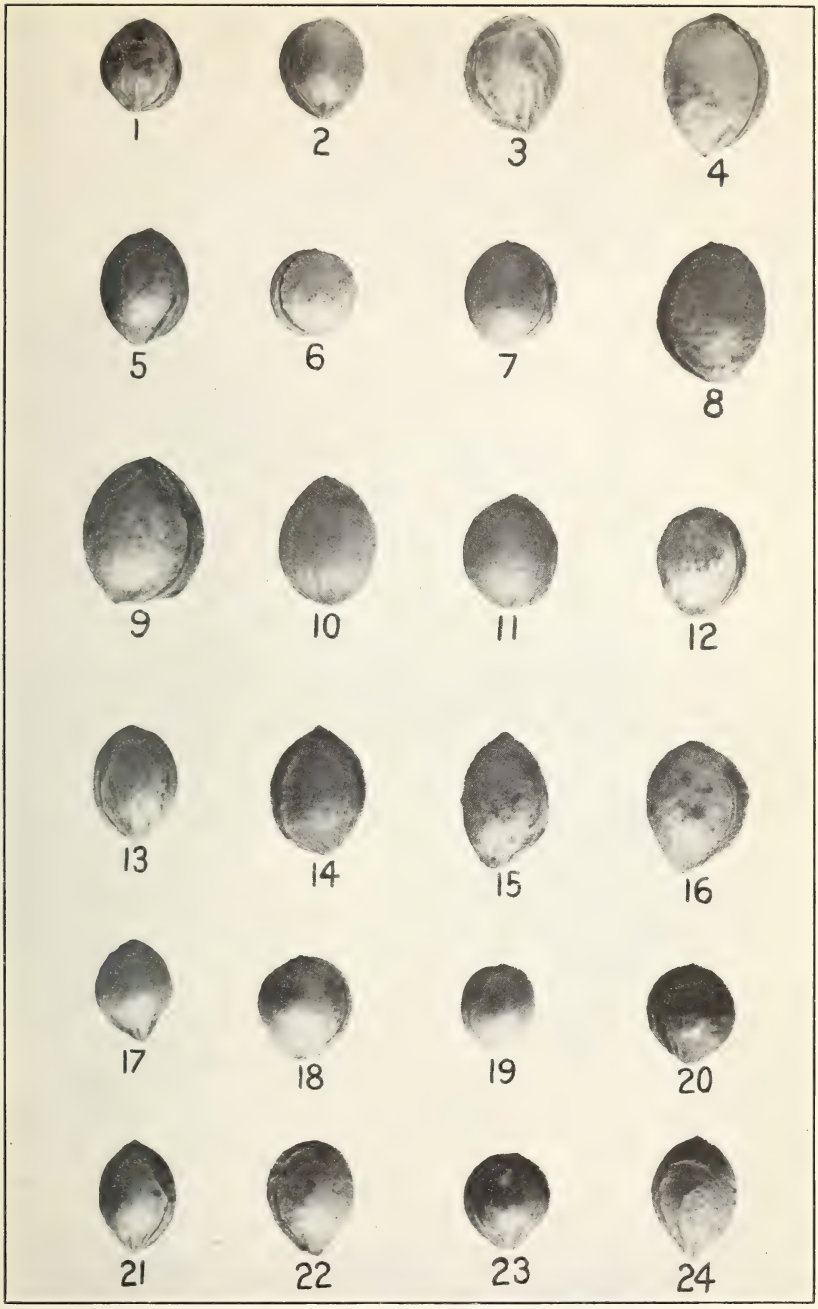
> In June, 1880, Dr. George Engelmann, of St. Louis, sent to the Arnold Arboretum a package of seeds marked "Prunus sp., southern Texas." Plants were raised from these seeds, and in 1888, or earlier, they flowered and produced fruit which showed that they belonged to a distinct and probably undescribed species. A name, however, was not proposed for it, and, in 1888 probably, plants or seeds were sent to Herr Späth, of the Rixdorf Nurseries, near Berlin, where this plum was found in flower by Dr. Emil Koehne, who has described it under the name of *Prunus orthosepala*.

There are no specimens from Texas in any of the American herbaria consulted that can be referred to this species, but seeds of another species, it seems, were received from Dr. Engelmann at the same time, and in 1910 they were with a specimen of *Prunus orthosepala* grown on the grounds and now in the herbarium of the Arnold Arboretum. These seeds represent a species that occurs in Texas, and it is quite possible that they are the ones referred to by Dr. Engelmann and that those of *P. orthosepala* did not come from that State. Still more doubt is cast on the Texas origin by the fact that in the Gray Herbarium of Harvard University, there are several fragmentary specimens of Prunus from Ellis, Kans., sent by Dr. Louis Watson to his brother, Sereno Watson. One of these specimens bears the date June 4, 1880; others were sent on August 1, 1881. These fragments consist of leaves and immature fruit. The leaves are very similar in shape to *P. orthosepala*, but vary considerably in the serration of the margin, the teeth of some being much more acute than others. *P. orthosepala* itself shows some variation in this respect, specimens from Dr. Koehne being more sharply serrate than those grown either in the Arnold Arboretum or in the nursery of Mr. J. W. Kerr, near Denton, Md. None of the Kansas specimens have the leaves so sharply serrate as in those from Dr. Koehne, but some of them appear to approach very closely those grown in the arboretum. The seeds, too, of several of them are practically identical with those of *P. orthosepala*, while others are somewhat more oblong. The following is an extract from Dr. Watson's letter describing the trees:

> I mail to-day a cigar box containing specimens of plums just gathered—some of them are from Mother Smith's garden from seed. She says I mustn't fail to tell you this. I number them from 1 to 7, thus: (1) 8 or 10 feet high, ripening considerably later than the others; (2) 6 or 8 feet, ripening now; (3) 6 feet, a freestone, ripening now; (4) "sand plum," 2 to 3½ feet, open leaves, ripening now; (5) "sand plum," 2 to 3½ feet, ripe now, with closed leaves (not a good specimen, as it does not show the closed leaf as much as common); (6) 6 feet, ripening; (7) egg-shaped plums of the taller sort, but I have no leaves except a small sprig attached to one.
>
> P. S.—Some bushes of the sand plum bear egg-shaped plums. I have added some specimens as No. 8; also put in some extra ones of the taller kind, whether I numbered them or not I don't know.

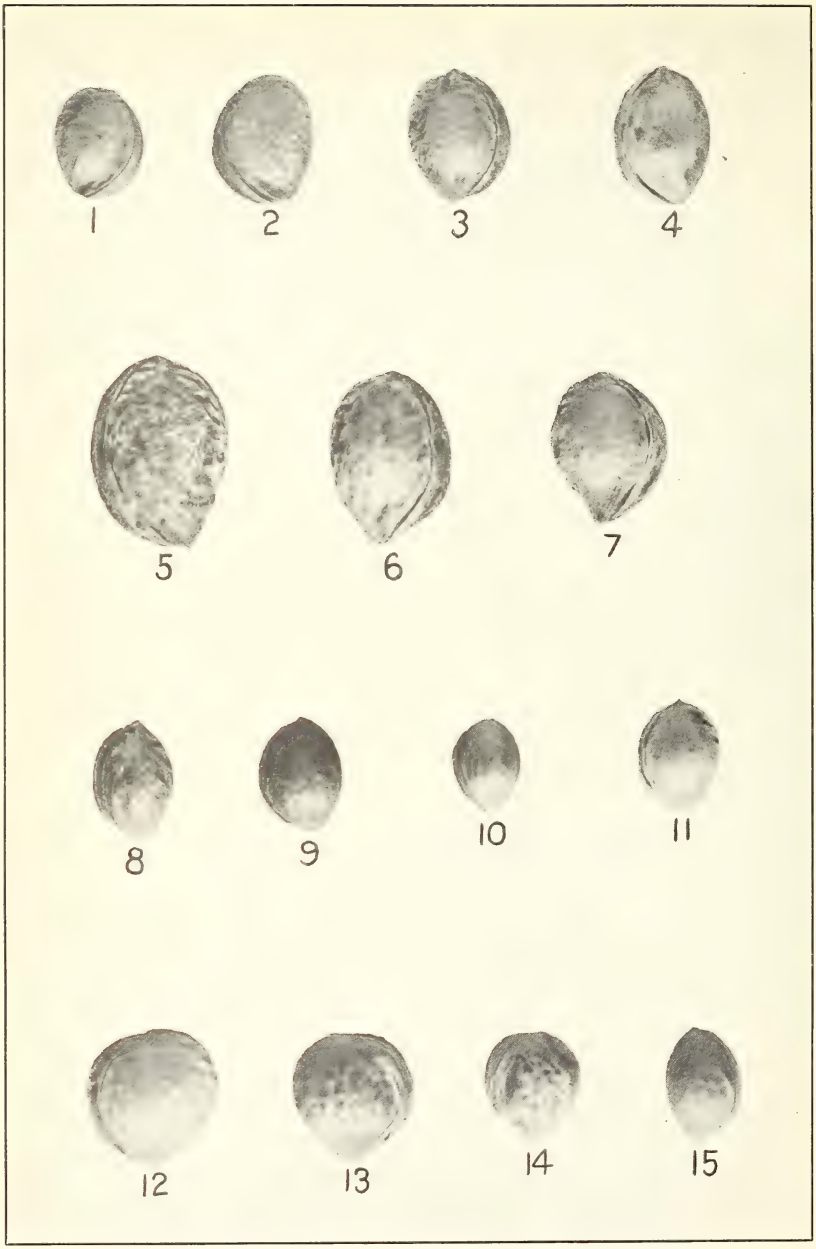
Of these, Nos. 4, 5, 6, and 7 are the sand plum, later described as *Prunus watsoni*, while all the others bear some resemblance in the character of the leaves and seeds to *P. orthosepala*. The specimen sent in June, 1880, is described as a "large yellow plum ripening last of August and later."

A small tree in Highland Park, Rochester, N. Y., which came originally from the Arnold Arboretum, is very evidently of the same character as the larger plums described by Dr. Watson, and the seeds were probably obtained at the same time as were those of *Prunus angustifolia watsoni*. This tree bore abundantly in 1911, the fruit



STONES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—I.

FIGS. 1 to 16.—*Prunus americana:* 1, From a wild tree, Hardystonville, N. J.; 2, from Easton, Pa.; 3, from Leon County, Fla.; 4, from Center Creek, southwestern Missouri; 5, from near Grand Rapids, Mich.; 6, from Terra Alta, W. Va.; 7 and 8, from Big Horn, Wyo.; 9, Hawkeye variety; 10, De Soto; 11, Rollingstone; 12, Wolf; 13, Ocheeda; 14, Wyant; 15, Wallace; 16, Wragg. FIGS. 17 to 24.—*Prunus mexicana:* 17, From a wild tree at Tulsa, Okla.; 18, from Oklahoma City, Okla.; 19, from Fulton, Ark.; 20, from Alexandria, La.; 21, from Fort Worth, Tex.; 22, from Dallas, Tex.; 23, from Gonzales, Tex.; 24, from San Antonio, Tex. (Natural size.)



STONES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—II.

FIGS. 1 to 7.—*Prunus nigra:* 1 and 2, From a wild tree near Atlanta, Mich.; 3, from Piscataquis River, Me.; 4, Cheney variety; 5, 6, and 7, Aitkin. FIGS. 8 to 15.—*Prunus subcordata:* 8, From a wild tree, Warner Mountains, Cal.; 9, from Klamath Indian Reservation, Oreg.; 10, from Pine Grove, Klamath County, Oreg.; 11, from Swan Lake Valley, Klamath County, Oreg.; 12, from Klamath Falls, Oreg.; 13 and 14, from Sprague River, Oreg.; 15, from Klamath Indian Reservation, Oreg. (Natural size.)

ripening at the same time and being scarcely distinguishable in color and shape from that of *P. orthosepala*. It is about 3 cm. long and nearly the same in diameter, being slightly larger than the fruit of the latter species and with a longer stone. (Pl. XIII, fig. 2.)

A plum very similar to if not identical with at least some of the above was first brought into cultivation by Abram Laire, a few miles south of Kirwin, in the southern part of Phillips County, Kans. (fig. 2). Mr. Laire was interviewed in September, 1910, and the following account of the variety known as Laire (Pl. XIII, figs. 3 to 5) was obtained. About the year 1878 (Mr. Laire is uncertain whether it may not have been a year or two later than that date) he and his son brought in from a wild state from various localities along Bow Creek a number of young plum trees. Among these trees when they fruited he discovered perhaps half a dozen trees that produced fruit of superior quality, and these were then noticed to have different foliage from either the sand plum or *Prunus americana*. Mr. Laire was, however, unable to rediscover the thicket from which they were obtained, although his son believes them to have been secured from a thicket in a pasture not far distant which had later been destroyed by cattle. E. Bartholomew, of Stockton, Kans., estimated in 1910 that there were at least 100,000 trees of this variety under cultivation in that part of Kansas, but he has never observed it in a wild state.

The variety Laire, as it grows in Kansas, is a larger tree than *Prunus orthosepala*, and the serrations of the leaves are distinctly rounded. The flowers appear identical with those of the latter species, except in the usually, though not always, shorter pedicels and in the length of the calyx lobes, which are slightly shorter, showing in these respects, as in the more rounded serrations of the leaves, a closer approach to the sand plum. The fruit is nearly globose, dark red with a distinct bloom, and ripens in September. The Laire also suckers badly, while *P. orthosepala* does not appear to do so, though possibly if grown under the same conditions as regards cultivation it might show that character.

The fact that all this closely related material came to notice about 1880 suggested that possibly *Prunus orthosepala* might have been of Kansas origin and led to a careful examination of Dr. Engelmann's notes and some of his correspondence, but without discovering anything concerning the origin of this species or, in fact, without finding mention of any form that could be interpreted as referring to it.

Prunus orthosepala, as it grows in the Arnold Arboretum and in Mr. Kerr's nursery, bears rather sparingly, but Mr. Kerr suggests that this may be due to the want of proper pollinizers. A specimen in Highland Park, Rochester, N. Y., where a number of other species are

also grown, produced a very good crop of fruit in 1911. The fruit of *P. orthosepala* is considered excellent in quality, and the Laire bears abundantly and is considered an excellent plum. It is possible that all of these forms represent natural hybrids of *P. americana* and the sand plum, both of which occur in northern Kansas; this would account for the variation and possibly also for their rare occurrence. Whatever their origin and whether they represent a natural species or hybrids, they are unquestionably promising, at least for the Plains region of Kansas and Oklahoma.

Prunus Alleghaniensis Porter.

(Northern sloe.)

Prunus alleghaniensis Porter, 1877, *in* Bot. Gaz., v. 2, no. 5, p. 85.

Leaves lanceolate to oval-lanceolate (Pl. V, fig. 2) or sometimes broadest above the middle and slightly oblanceolate, mostly 6 to 9 cm. long, 2 to 3 cm. broad, acute or acuminate, the margin finely and sharply serrate, very rarely doubly serrate, with or without glands near the base of the blade, green and glabrous or sparingly pubescent above and pale green below, usually pubescent, at least when young, sometimes becoming glabrous with age, midvein prominent; petiole 7 to 12 mm. long, pubescent, at least on the upper side, rarely glandular at the apex; stipules linear with bright reddish glands along the margin. Flowers appearing before the leaves from the last of April to the middle of May, 10 to 12 mm. broad, in nearly sessile umbels of 2 to 4; pedicels mostly 9 to 10 mm. long, slender, sparingly hairy or glabrous; calyx narrowly obconic, pubescent or sometimes glabrous, at least in cultivated specimens, the tube about 3 mm. long and obscurely ribbed, the lobes narrowly oblong-ovate, about 2 mm. long, erect, sparingly hairy or glabrous within; petals about 5 mm. long, round-obovate and abruptly narrowed to a short claw, the margin entire or sparingly erose toward the apex, white, turning pinkish with age. Fruit subglobose or somewhat oval or obovoid, about 10 mm. in its greatest diameter, very dark purple and covered with bluish bloom, flesh yellow, ripening in August; stone (Pl. XII, figs. 1 to 3) 11 to 12 mm. long, 8 mm. broad, slightly obovoid and rather obtuse at the apex, turgid, the ventral edge rather thick and grooved and the dorsal edge obscurely grooved, the surface obscurely roughened.

The species is a shrub 3 to 6 feet high, or more rarely a small tree 12 or more feet high, often forming thickets of considerable extent; branches rarely spinescent, bark of the larger branches comparatively smooth, very dark gray, that of the young twigs reddish brown and somewhat lustrous, pubescent or frequently glabrous, lenticels oval or round, slightly raised, yellowish brown; winter buds ovate, the scales slightly hairy or glabrous.

Prunus alleghaniensis (fig. 3) was described as occurring from Huntingdon County, Pa., on the limestone bluffs of the Little Juniata, northward through the barrens and westward over the Alleghenies as far as the extremity of Bear Mountain, Elk County. Specimens of the species were distributed to various American herbaria, and it was grown on the Lafayette College campus, Easton, Pa. It is grown in the Arnold Arboretum, Jamaica Plain, Mass., the tree there being about 18 feet high, and in the arboretum of the Central Experimental Farm near Ottawa, Canada, though it does not appear to be very hardy in the latter locality. It has been found in Connecticut, at Lisbon, sandy bottoms along the Quinebaug River; at Lyme, bank of the Connecticut River; at Bridgeport "about 100 plants 10 to 16 feet high," in a wet thicket bordering a small stream; at Monroe, in a hillside pasture; and at Southbury, by a roadside, in sandy soil.

The fruit is used locally, but it does not appear to have been utilized in any way in horticulture.

PRUNUS ALLEGHANIENSIS DAVISII W. F. Wight.

Leaves ovate or oval (Pl. V, fig. 3) 4.5 to 8 cm. long, 2.5 to 4 cm. broad, narrowed or rounded at the base, acute or sometimes slightly acuminate at the apex, the margin serrate with acute teeth, green and glabrous above, pale below and glabrous except along the rather prominent midvein, occasionally with a gland on either side near the base of the blade; petioles 6 to 10 mm. long, pubescent, rarely with a gland near the apex. Flowers 8 to 9 mm. broad, appearing in May before the leaves, in umbels of 2 to 4; pedicels 6 to 9 mm. long, glabrous; calyx obscurely and sparingly hairy, the tube obconic, 2.5 to 3 mm. long, the lobes oblong-ovate, about 2 mm. long, eglandular, bidentate at the apex or entire and acute, the inner surface rather densely pubescent with longish hairs; petals obovate, 5 to 6 mm. long and 3 to 4 mm. broad, narrowed to a claw, entire or erose toward the apex. Fruit subglobose or slightly oval, about 15 mm. in diameter, dark purple or almost black with a bluish bloom, ripening in September, the quality usually poor; stone ovate and pointed at each end (Pl. XII, figs. 4 to 6) or sometimes obtuse at the apex, 10 mm. long, 6.5 mm. broad and 5 mm. thick, rounded on the ventral edge with a shallow groove on either side, grooved along the dorsal edge, the surface obscurely roughened or reticulated.

Prunus alleghaniensis davisii is a shrub 3 to 9 feet high, the young twigs reddish chestnut, almost lustrous, turning gray or brownish the following year; lenticels round and lighter colored.

It is occasionally found in thickets along gravelly ridges from the southern part of Roscommon County northeastward for about 60 miles to the vicinity of Atlanta, in Montmorency County, Mich., and doubtless careful search will show a wider distribution.

Type specimens in the economic collection of the United States Department of Agriculture were collected, flowers, May, 1910, by O. F. Barnes, about 10 miles northeast of Roscommon, foliage and fruit September 23, 1910, by W. F. Wight, No. 4698, about 4 miles south of Houghton Lake, Mich. Attention was first called to this plum by C. A. Davis, of the United States Geological Survey, who had observed a blue-fruited plum of the *maritima* type growing along the gravelly ridges in the region south of Houghton Lake. Mr. Davis believed it would be found to be an undescribed species, and it is accordingly named for him. It differs from the species mainly in its leaves, which are broader in proportion to their length and less acuminate toward the apex. It may be distinguished from *Prunus maritima* by the reddish color of the young twigs, the more glabrous leaves, glabrous pedicels, and by the stone being pointed instead of rounded at the base.

The fruit is used locally in making jellies and conserves.

Prunus Umbellata Elliott.

(Sloe.)

Prunus umbellata Elliott, 1816, Sketch Bot. S. C. and Ga., v. 1, p. 541.

Leaves lanceolate, oblong-lanceolate or oval (Pl. V, fig. 4), 4 to 7 cm. long, 1.2 to 3 cm. broad, in age becoming rather firm in texture, narrowed or rarely rounded at the base, usually acute at the apex, the margin finely serrate with acute, incurved, rarely gland-tipped teeth, glabrous above, usually pubescent below along the midrib, and sometimes also along the lateral veins and the margin of the blade toward the base, marked with one or two glands near the base of the blade or toward the apex of the petiole, or eglandular; petioles mostly 5 to 7 mm. long, pubescent, at least along the upper surface. Flowers 10 to 18 mm. broad, appearing before the leaves the last of February or in March, in umbels of 2 to 4; pedicels 8 to 10 mm. long, slender and glabrous; calyx tube narrowly obconic, glabrous, about 3 mm. long, the ovate, obtuse lobes 1.5 to 2 mm. long, very obscurely hairy without, more strongly pubescent within, entire or minutely toothed at the apex, mainly erect at anthesis; petals oblong-obovate to nearly orbicular, 4 to 6 mm. long. Fruit globose, about 12 to 20 mm. in diameter, red, yellow, or more often dark purple when fully ripe, and covered with a glaucous bloom, ripening from the last of July to September; stone oval or nearly globose (Pl. XII, figs. 7 to 13), about 11.5 to 15 mm. long, 8.5 to 11 mm. broad, 6.5 to 8 mm. thick, obtuse or sometimes slightly pointed at the ends, variously grooved near the ventral and usually along the dorsal edge, the surface smooth or reticulate.

The tree is 15 to 20 feet high, forming a compact head; bark of the trunk dark brown, separating into small appressed scales; branches often somewhat spinescent, clothed with dark-brown bark, that of the young twigs glabrous, dark reddish brown, and marked with oval or round lenticels.

The species (fig. 3)[1] was originally described from "very dry, sandy soils," in South Carolina and Georgia, and extends southward in Florida to Tampa, and westward at least to the Apalachicola River. In the coast region of eastern Florida it appears to have a larger, more turgid, often more nearly globose stone than in the western part of its range from which material has been seen, but otherwise it does not differ. In some localities the fruit is commonly

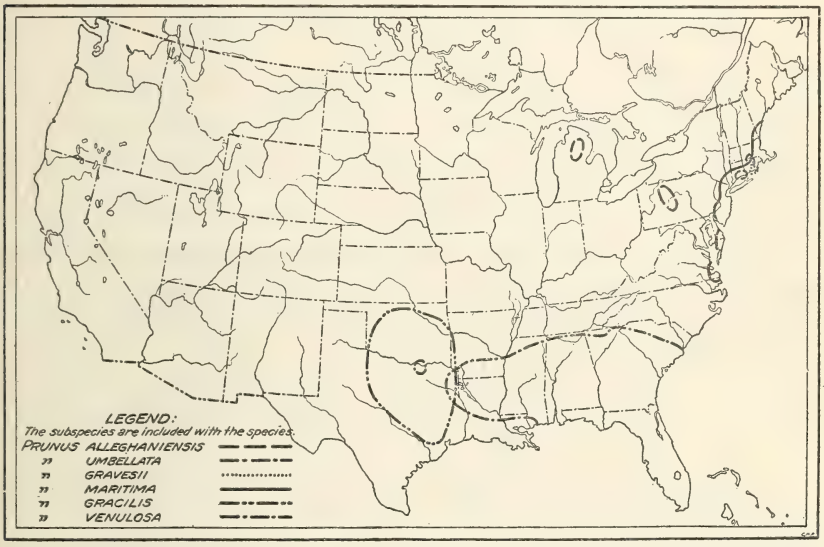


FIG. 3.—Outline map of the United States, showing the distribution of native American species of Prunus: *Alleghaniensis, umbellata, gravesii, maritima, gracilis,* and *venulosa.*

yellowish. Dr. Hugh M. Niesler, writing from Taylor County, Ga., in 1860, says:

> The fruit is much smaller [than *P. angustifolia*] and exceedingly sour, its color yellowish red—the yellow predominating, but still a color which I have never seen approached very closely by any Chicasa plum. I have never seen the tree elsewhere than along the streams and around the fields near Columbus.

The fruit is occasionally gathered and used for preserves.

PRUNUS UMBELLATA INJUCUNDA (Small) Sargent.

Prunus injucunda Small, 1898, *in* Bul. Torrey Bot. Club, v. 25, no. 3, p. 149.
Prunus mitis Beadle, 1902, *in* Biltmore Bot. Studies, v. 1, no. 2, p. 162.
Prunus umbellata injucunda Sargent, 1902, Silva N. Amer., v. 13, p. 21.

[1] The Elliott herbarium is preserved in the Charleston (S. C.) Museum.

Leaves oval or oblong-oval, mostly 5 to 8 cm. long, 2 to 3.5 cm. broad, narrowed toward the base, acute or acuminate at the apex, obscurely pubescent above, pubescent below, sometimes strongly so, very rarely glabrous except along the midvein; petioles 5 to 9 mm. long, pubescent. Flowers appearing in March or April, 12 to 15 mm. broad; pedicels and calyx usually pubescent, sometimes obscurely so. Fruit similar to the species; stone oval and usually pointed at both ends, about 13 mm. long.

Prunus umbellata injucunda ranges from the extreme southwestern part of North Carolina through the hill country of Georgia to Mississippi, and probably merges imperceptibly into the subspecies *P. umbellata tarda.*

Prunus umbellata injucunda was described as a species from "sandy soil on the granite districts from Stone Mountain, Ga.," and the type collected by John K. Small, July 7, 1893, is in the herbarium of the New York Botanical Garden. This represents a form with extremely pubescent foliage and branchlets. *Prunus mitis* was described from specimens collected at Auburn, Lee County, Ala., March 27 and May 20, 1900, by F. S. and Esther S. Earle, No. 27, and type material is preserved in the Biltmore Herbarium. This form has less pubescent foliage and glabrous twigs, but numerous specimens show various intermediate stages, some from the same region on sandy soil having glabrous twigs while those on clay soil were strongly pubescent, the trees differing in no other character.

PRUNUS UMBELLATA TARDA (Sargent) W. F. Wight.

Prunus tarda Sargent, 1902, *in* Bot. Gaz., v. 33, No. 2, p. 108.

Leaves oblong-oval or rarely obovate, narrowed at the base, acute or shortly acuminate at the apex, 4 to 8 cm. long, 1.5 to 3.5 cm. broad, dull yellowish green, finely and obscurely pubescent or glabrate above, pale and somewhat pubescent below, at least along the midrib and prominent lateral veins, the margins serrate with acute somewhat incurved teeth; petioles tomentose. Flowers appearing in April, about 12 mm. broad; pedicels glabrous; calyx tube sparingly pubescent without, more strongly hairy within; petals oblong-obovate, 5 to 6 mm. long. Fruit subglobose or slightly oval, 10 to 15 mm. in diameter, yellow, purple, red, or dark blue in color, with a bloom, ripening in October and November; stone as in the preceding.

The tree is 18 to 25 feet high, with light reddish brown bark exfoliating in small platelike scales, that of the branchlets somewhat lustrous. *Prunus umbellata tarda* is very similar to the species, but may be distinguished by its lighter bark, later ripening fruit, and more oblong stone. The type specimens, collected on April 19, 1901,

by William M. Canby, B. F. Bush, and C. S. Sargent, are in the herbarium of the Arnold Arboretum.

This form is distributed through western Mississippi, Louisiana, and southern Arkansas to the vicinity of Marshall, Tex., the type locality.

Prunus Maritima Marsh.[1]

(Beach plum.)

Prunus maritima Marsh., 1785, Arb. Amer., p. 112.
Prunus pygmaea Willd., 1796, Berl. Baumz., p. 248.
Prunus sphaerocarpa Michx., 1803, Fl. Bor. Amer., t. 1, p. 248.
Prunus acuminata Michx., 1803, Fl. Bor. Amer., t. 1, p. 284.
Prunus sphaerica Willd., 1811, Berl. Baumz., Ausg. 2, p. 315.
Prunus pubescens Pursh., 1814, Fl. Amer., Sept., v. 1, p. 331.
Prunus littoralis Bigel., 1824, Fl. Bost., ed. 2, p. 193.
Prunus pubigera Steud., 1841, Nom. Bot., ed. 2, part 2, p. 404.

Leaves ovate, elliptic, or rarely somewhat obovate (Pl. V, fig. 1), narrowed toward the base and acute at the apex, 4 to 6.5 cm. long, 2 to 4 cm. broad, the margin evenly and sharply serrate, dull green and glabrous or nearly so above, pale and soft-pubescent, sometimes appearing grayish below, often with a gland on either side near the base of the blade; petioles rather stout, 4 to 6 mm. long, pubescent. Flowers 12 to 14 mm. broad, in umbels of 2 to 3, appearing before the leaves, in May or early in June; pedicels and calyx rather strongly pubescent, pedicels 5 or usually 7 mm. long; calyx tube campanulate, about 2 mm. long, the oblong obtuse lobes as long as the tube, entire or dentate at the apex, eglandular, pubescent within with rather short hairs; petals oblong or oblong-ovate, about 7 mm. long, 4 mm. broad, abruptly narrowed to a claw. Fruit globose or slightly flattened at the ends, about 15 mm. in diameter, dull purple, with a heavy bloom, sometimes crimson or even yellow, ripening in August on the New Jersey coast and in September on the coast of Massachusetts, flesh sweet; stone ovate and turgid (Pl. XII, figs. 14 to 17), about 10 mm. long, 9 mm. broad, and 6 mm. thick, truncate or rounded at the base, usually pointed at the apex, a little narrowed on the ventral edge with a groove on either side, obscurely grooved along the dorsal edge, the surface usually slightly reticulate.

Prunus maritima is a straggling shrub mostly 3 to 6 or rarely 8 feet high, with the lower branches decumbent or often prostrate; bark very dark gray or brownish, usually marked with numerous round, sometimes raised, yellowish lenticels; young twigs usually pubescent.

The species is distributed (fig. 3) in sandy soil near the seacoast from

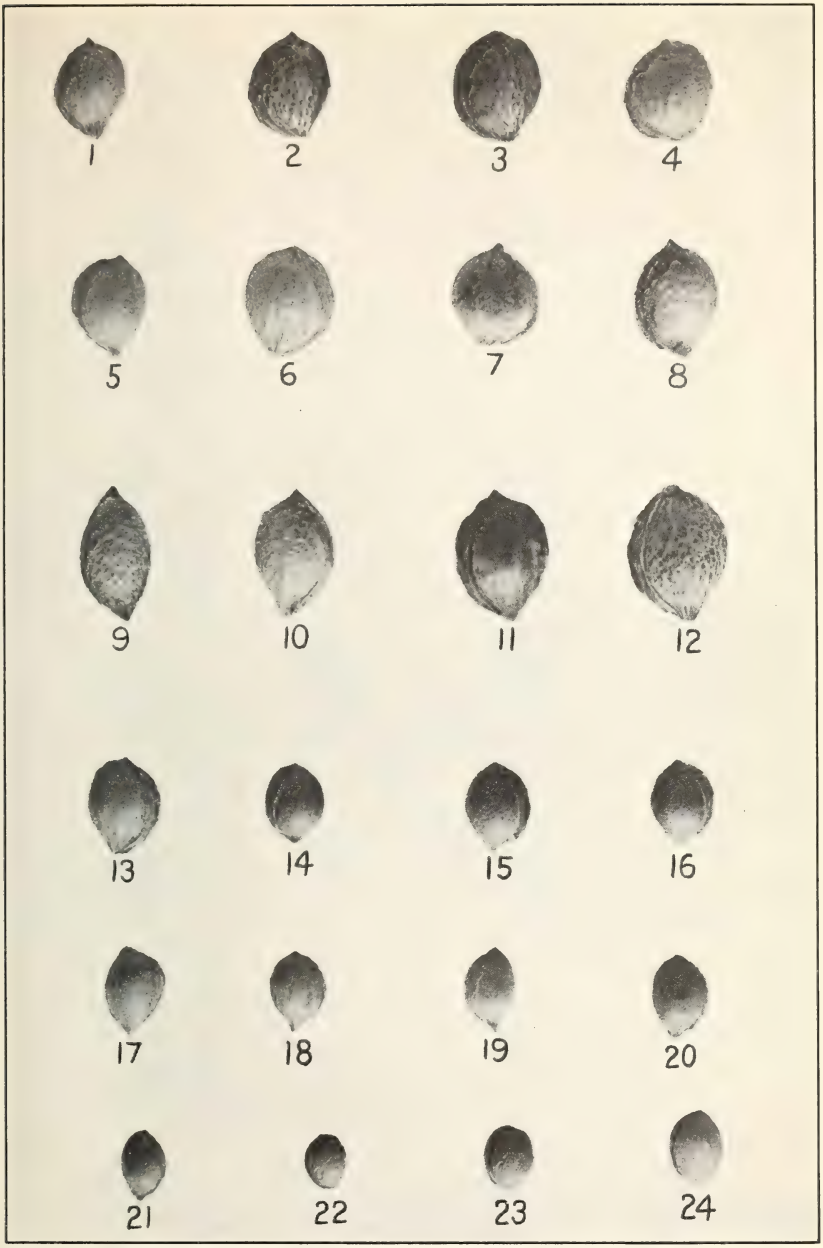
[1] The authority usually given for this species is Wangenheim (1781, p. 103). This author published (74) in 1781 Beschreibung einiger Nordamericanischer Holz- und Buscharten, mit Anwendung auf teutsche Forsten. Two copies of this work have been carefully searched, but without finding any trace of the name *Prunus maritima*. In another work (75), published in 1787, Wangenheim describes this species on page 103. It seems probable that an error has been made in the date of Wangenheim's publication and that Marshall is really the author of the species.

the vicinity of Scarboro, Me., to Fortress Monroe, Va. It occasionally occurs a few miles inland in Connecticut, and in New Jersey it ranges inland to within about 12 miles of Camden and to Bordentown; it has also been collected at Sellersville, Pa.

Prunus maritima is recorded by Chapman (13, p. 131) from Alabama, and the basis of this record is an imperfect specimen collected by Buckley. Sargent thinks (66, p. 28) it possible that this specimen represents a form of *P. alleghaniensis*. It is much more probable, however, that it is *P. umbellata injucunda*. The species has also been reported from the shores of Lake Michigan (32, p. 33; 5, p. 214) in the vicinity of Chicago and near the head of the lake. Most of the specimens cited by Higley and Raddin are in the herbarium of the Northwestern University, and all of these were found to be *P. pumila*. A considerable part of the region about the head of the lake was explored the past summer, but without finding any trace of *P. maritima*. A letter from E. J. Hill, who went to Chicago in 1874 and has probably studied the flora of the region as carefully as any one, states that he has never found the species there, although familiar with its reported occurrence.

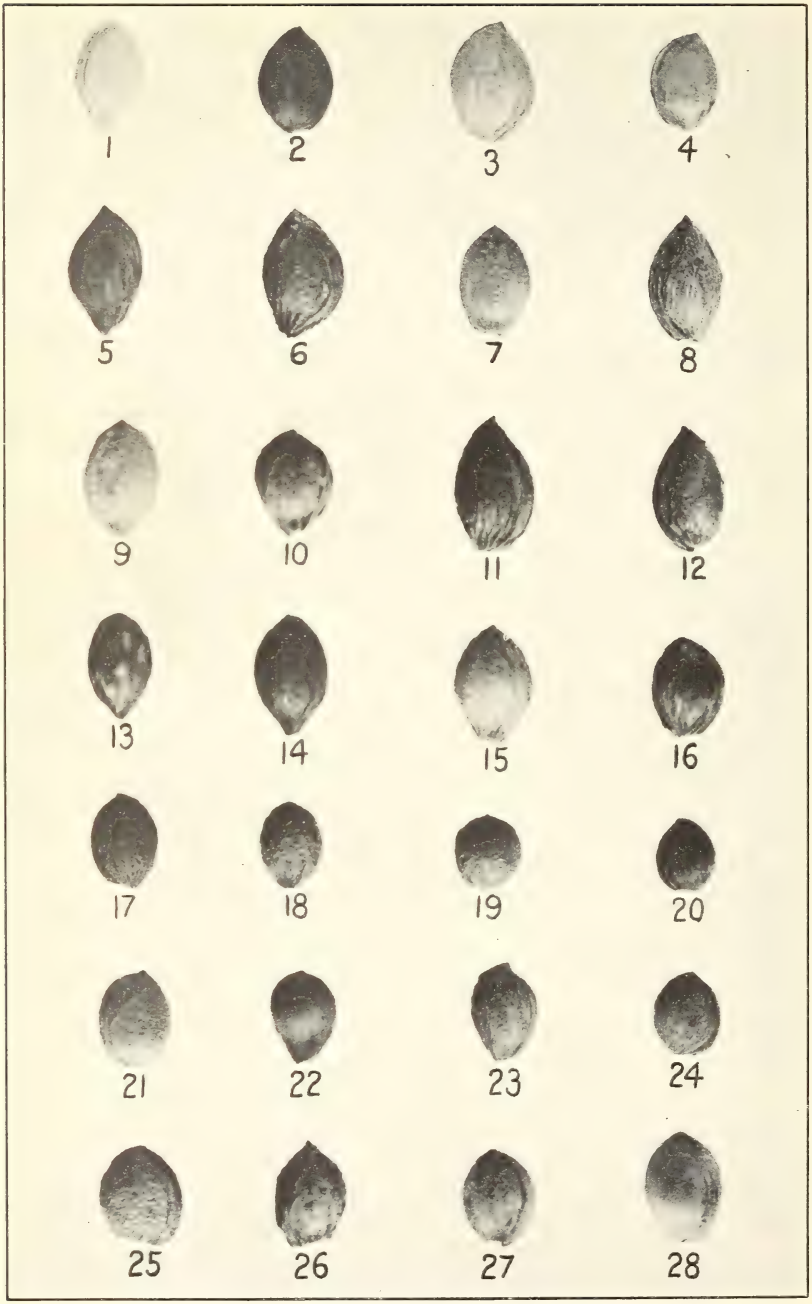
Prunus sphaerocarpa was described from the New England seacoast; *P. declinata* was very briefly described and no locality given, but the description apparently refers to the beach plum; *P. acuminata*, "Hab. in Virginia," is apparently also this species, although it can scarcely be positively identified from the description alone; *P. pygmaea* was described from garden material grown from North American seed and distributed as *Prunus maritima* by the "Herrn von Wangenheim"; *P. pubescens* was apparently based in part on *P. sphaerocarpa* Michx. "on the seacoast of New England" (not on *P. sphaerocarpa* Swartz), and on material collected "in the western parts of Pennsylvania, on the borders of lakes," the latter locality unquestionably representing a different species. *P. littoralis* and *P. sphaerica* are also apparently based on *P. sphaerocarpa* Michx.; *P. pubigera* is based on "*P. pubescens* Poir. (non. Pursh.)." Poiret does not describe a new species, but quotes the description of Pursh.

Prunus maritima is an attractive ornamental, on account of the profusion of its bloom, and it is occasionally planted in the East. It has given rise to a few named varieties, Bassett (5, p. 214), Alpha, and Beta, and the fruit is frequently gathered from wild trees. When grafted and grown under favorable conditions, it sometimes becomes a small tree. This species attracted the attention of horticulturists comparatively early and was apparently often considered quite as valuable as *Prunus americana*. No doubt fruit was often found as large and as palatable as that of *P. americana* in the eastern part of its range, but when horticultural development in the West brought to the attention of pomologists the better forms of the latter and of other species, *P. maritima* gradually ceased to be mentioned.



STONES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—III.

FIGS. 1 to 12.—*Prunus hortulana:* 1, From a wild tree near Terre Haute, Ind.; 2, from Courtney, near Kansas City, Mo.; 3, from Allenton, Mo.; 4, 5, and 6, from Joplin, Mo.; 7, Read variety; 8, Golden Beauty; 9, World Beater; 10, Wayland; 11, Maquoketa; 12, Miner. FIGS. 13 to 22.—*Prunus reverchonii:* 13, 14, 15, 16, and 17, From a wild shrub near Denison, Tex.; 18, from McKinney, Tex.; 19, from Henrietta, Tex.; 20, from Waco, Tex.; 21 and 22, from near Henrietta, Tex. FIGS. 23 and 24.—*Prunus rivularis:* From a wild shrub, San Antonio, Tex. (Natural size.)



STONES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—IV.

FIGS. 1 to 16.—*Prunus munsoniana:* 1, From a wild tree, Allenton, Mo.; 2, from Fulton, Ark.; 3, Arkansas variety; 4, from near Denison, Tex.; 5, from near Henrietta, Tex.; 6, Downing variety; 7, Miles; 8, Milton; 9, Newman; 10, Texas Belle; 11 and 12, Wild Goose; 13, Wooten; 14, Poole Pride; 15, Robinson; 16, Smiley. FIGS. 17 to 28.—*Prunus angustifolia:* 17, From a wild tree near Washington, D. C.; 18, from Denton, Md.; 19, from Jacksonville, Fla.; 20, from Lee County, Ala.; 21, from near Denison, Tex.; 22, from Ellis, Kans.; 23, from Motley County, Tex.; 24, Strawberry variety; 25, Caddo Chief; 26, Fawn; 27, Piram; 28, Yellow Transparent. (Natural size.)

PRUNUS MARITIMA HYBRIDS.

Hybrids have been produced by Luthur Burbank and J. W. Kerr. Among those secured by Mr. Kerr are several of remarkably clean foliage and vigorous character, probably with *Prunus triflora* as one of their parents. At least one of these has fruit 1¼ inches in diameter, although not of very good quality. Nevertheless, this species shows evidence of much promise, and with a careful search among wild trees for fruit of good quality as a basis something of value may ultimately be secured. (Pl. XIII, fig. 10.)

PRUNUS GRAVESII Small.

Prunus gravesii Small, 1897, *in* Bul. Torrey Bot. Club, v. 24, No. 1, p. 45.

Leaves orbicular to oblong-orbicular, 18 to 30 mm. long, 20 to 25 mm. broad, the margin sharply serrate, green and finely pubescent or glabrate above, pale green below and pubescent, at least along the veins; petioles about 3 mm. long, pubescent; stipules linear, glandular, and pubescent. Flowers appearing before or with the leaves from the middle to the last of May, in umbels of 2 to 3 or sometimes solitary, about 10 to 15 mm. broad; pedicels and calyx pubescent, pedicels about 6 mm. long; calyx tube 2.5 to 3 mm. long, the ovate, obtuse lobes 2 to 2.5 mm. long, pubescent on both surfaces, eglandular; petals about 5 mm. long, orbicular, and contracted near the base to a distinct claw. Fruit globose, 10 to 15 mm. in diameter, deep purple with light-blue bloom, slightly astringent, ripening early in September; stone subglobose or broadly oval (Pl. XII, figs. 18 and 19), about 8 by 6.5 by 5.5 mm., obscurely ridged on the dorsal and thickened on the ventral edge, with a line along the center and an indistinct ridge a short distance back on either side.

The species is a low, unarmed shrub scarcely more than 3 feet high, with a dark, rather rough bark and usually puberulent twigs.

This rare species is related to *Prunus maritima* and is known only from the original locality at Groton, Conn., where it grows on a gravelly ridge near Long Island Sound (fig. 3). The species was discovered and the type specimens (in the herbarium of the New York Botanical Garden) collected by Dr. Charles B. Graves, for whom it is named.

PRUNUS GRACILIS Engel. and Gray.

Prunus gracilis Engelm. and Gray, 1845, *in* Boston Jour. Nat. Hist., v. 5, No. 2, p. 243.
Prunus chicasa normalis Torr. and Gray, 1840, Fl. N. Amer. v. 1, p. 407.
Prunus normalis Small, 1903, Fl. Southeast. United States, p. 572.

Leaves oval (Pl. VII, fig. 1), rarely ovate, or still more rarely obovate-lanceolate, 2.5 to 5 cm. long, 1.5 to 2.5 cm. broad, pointed at each end or rarely obtuse at the apex, finely and obscurely pubescent

above, pale and strongly pubescent and reticulate below, the margin finely serrate with acute or sometimes obtuse teeth, these gland tipped when young, the blades with or without a gland on either side near the base; petioles 5 to 8 mm. long, pubescent and eglandular, or with one or two glands near the apex. Flowers 9 or 10 mm. broad, appearing before the leaves from the middle of March to about the middle of April, in umbels of 2 to 4; pedicels and calyx finely pubescent, the pedicels 7 to 10 mm. long; calyx tube campanulate, 2.5 mm. long, the lobes ovate and acute, entire or minutely dentate toward the apex, 1.5 to 2 mm. long, eglandular, pubescent on both surfaces; petals obovate to obovate-orbicular, 4 to 5 mm. long and about 3 mm. broad. Fruit globose or slightly oval, 14 to 18 mm. in diameter, usually red, with a light bloom, ripening from the middle of June in the South to early in August and said to be quite palatable; stone oval (Pl. XII, figs. 20 and 21), about 13 mm. long, 9 mm. broad, and 6 mm. thick, somewhat obtuse at the ends, a thick wing on the ventral edge, with a groove on either side and a shallow groove along the dorsal edge, the surface nearly smooth.

Prunus gracilis is a small, straggling shrub 1 to 4 feet high, growing in scattered clumps or forming loose thickets; bark of the stem grayish, that of the young twigs pubescent, dull reddish brown turning to gray during the first winter.

Its area of distribution (fig. 3) is from northern Oklahoma and the extreme western part of Arkansas southward to the Colorado River, in Texas. The Tennessee locality frequently cited appears to be based on the young foliage of *Prunus mexicana*.

The following note is taken from a specimen labeled "Arkansas River, Ind. Terr., 1882."

> It seldom attains a greater height than 4 feet and when in full fruitage lays down upon the grass beneath it, vinelike. The fruit is larger when found on larger shrubs. It abounds only on sandy soil and delights in a sand bluff. Millions of this fruit grow on the Arkansas River and its tributaries in Kansas [?] and the Indian Territory. It is finely flavored and of every shade of color when ripe; different specimens ripen at different dates, so "plum season" is a long one.

Mr. T. V. Munson says it is especially subject to the attacks of the "black-knot" fungus (*Plowrightia morbosa* (Schw.) Sacc.), and for that reason he endeavored to destroy a small thicket growing in his nursery at Denison, Tex.

Prunus chicasa normalis was described from "Texas and Arkansas, Dr. Leavenworth; Texas, Drummond." These specimens are in the herbarium of the New York Botanical Garden. That of Drummond from Texas is *P. gracilis*. Dr. Leavenworth's Arkansas specimen is labeled "*Prunus chicasa* β. Prairies of Arkansas, April," and appears to be *P. angustifolia*. The Texas sheet of this collector has two specimens, one in flower, which is *P. gracilis*, and the other with foliage and fruit, which does not appear to be this species. *P. gracilis*

appears to have been based on the collection of Lindheimer, "Open post-oak woods west of the Brazos, where it is called 'post-oak plum,'" specimens of which are in both the Missouri Botanical Garden herbarium and the Gray herbarium. They are all *P. gracilis*.

PRUNUS VENULOSA Sargent.

Prunus venulosa Sarg., 1911, Trees and Shrubs, v. 2, pt. 3, p. 157.

Leaves ovate to oblong-ovate (Pl. VII, fig. 2), mostly 5 to 7 cm. long, 2.5 to 3.5 cm. broad, gradually rounded at the base and acute or abruptly acuminate at the apex, dull green and glabrous or sometimes sparingly hairy above with short appressed hairs, very reticulate veiny below, and usually rather strongly pubescent with short hairs, becoming less so with age, the margins serrate and apparently glandular when young, but the glands falling away and usually leaving the serrations more or less obtuse, leaf blades only slightly or not at all folded when pressed; petioles 10 to 12 mm. long, with or without one or two glands near the apex, pubescent along the upper surface. Flowers 6 to 7 mm. broad, appearing before the leaves during the latter part of March, in umbels of 2 to 4; pedicels 3.5 to 5 mm. long, glabrous or nearly so; calyx campanulate, glabrous or sparingly pubescent, the tube about 1.5 mm. long, the lobes scarcely more than 1 mm. long, ovate, the margin glandular and slightly ciliate, sparingly hairy within toward the base; petals 2.5 to 3 mm. long, orbicular and abruptly contracted to a very short claw, erose toward the apex or entire. Fruit globose, 14 to 20 mm. in diameter, dark red, ripening in July, and poor in quality; stone oval (Pl. XII, figs. 22 to 24), 10 to 11 mm. long, 8 to 9 mm. broad, and about 6.5 mm. thick, somewhat pointed at the base and rounded at the apex, irregularly grooved and ridged near the ventral edge and with a shallow groove along the dorsal edge, the surface smooth.

Prunus venulosa is a small shrub 3 to 6 feet high, forming dense thickets. Bark of the stem dark gray, the young twigs finely pubescent or glabrate, dull reddish chestnut turning dark gray with age, marked with lighter colored oval lenticels.

The species is known only from a few localities in the vicinity of Denison, in northern Texas (fig. 3).

Prunus venulosa is more nearly related to *P. gracilis* than any other species, but it is a larger shrub and forms more dense thickets, the leaves are larger and more coarsely serrate, and the pedicels of the flowers are glabrous or nearly so, while they are strongly pubescent in *P. gracilis*. The type specimens are preserved in the herbarium of the Arnold Arboretum. Horticulturally the species shows no promise whatever. Its rare occurrence as well as its general character suggests that it may possibly be of hybrid origin, and if so, the species concerned are *P. gracilis* and *P. reverchonii*.

Prunus Pennsylvanica L. f.

(Bird cherry. Pin cherry.)

Prunus pennsylvanica L. f., 1781, Suppl. Pl., p. 252.
Prunus persicifolia Desf., 1809, Hist. Arb., pt. 2, p. 205.
Prunus montana Marsh., 1785, Arb. Amer., p. 113.
Prunus lanceolata Willd., 1796, Berl. Baumz., p. 240.

Mature leaves lanceolate (Pl. VI, fig. 1), oblong-lanceolate or oval-lanceolate, narrowed or rounded at the base, acuminate toward the apex, the young leaves at first oval or ovate, sometimes slightly falcate, 6 to 12 cm. long, 1.5 to 4 cm. broad, the margin finely serrate with glandular incurved teeth, entirely glabrous or slightly pubescent below along the prominent midvein and the lateral veins near their junction with the midvein, or, when young, sometimes sparingly and inconspicuously pubescent on the lower surface; stipules linear and glandular serrate. Flowers 9 to 12 mm. broad, appearing with the half-grown leaves from early in May to the last of June in the northern part of its range, 3 to 7 together in umbellike or sometimes corymblike clusters, the latter sessile or sometimes short stalked; pedicels 12 to 18 mm. long, slender and glabrous; calyx obconic, glabrous, the tube 2.5 to 3 mm. long, the oblong or ovate-oblong obtuse lobes about 2 mm. long, eglandular, reflexed at anthesis; petals about 5 mm. long, oblong-orbicular and abruptly contracted to a short claw, sometimes slightly pubescent on the outer surface near the base. Fruit globular, with thin flesh, 6 to 7 mm. in diameter, red, ripening from the middle of July to the first of September; stone oblong-oval to roundish oval (Pl. XII, figs. 35 to 37), 5 to 6 mm. long, with a thickened obscurely grooved ridge on the ventral side.

Prunus pennsylvanica sometimes attains a height of 30 or 35 feet, often sprouting from the roots and forming thickets. The bark of the older trunks is somewhat scaly, while that of the smaller trunks and branches is rather smooth and reddish brown, marked with prominent horizontal bands of lenticels. It separates in horizontal papery strips, resembling the birch in this respect. The bark of the young twigs is reddish and somewhat lustrous.

Prunus pennsylvanica ranges (fig. 4) from Newfoundland and New England westward through the valley of the St. Lawrence, Pennsylvania, northern Ohio, and northern Indiana to the Black Hills and the eastern slopes of the Rocky Mountains, where it passes into the subspecies. It apparently does not occur north of Lake Huron, but extends northwestward from the western end of Lake Superior to the Winnipeg Valley. It is reported to extend to the shores of Hudson Bay (66, p. 36), but no specimens have been seen from that region. It is common in the Alleghenies from Pennsylvania south-

ward to southwestern North Carolina and is said to reach its greatest size in this region.

The fruit of this species is not edible, but the tree is sometimes used as a stock on which to bud the sour cherry (*Prunus cerasus*) and in northern regions is the only stock on which that fruit has as yet been successfully grown. A. S. Fuller (25, p. 184) notes as early as 1867 that the wood of this species and that of the cherry unite very readily.

PRUNUS PENNSYLVANICA CORYMBULOSA (Rydb.) W. F. Wight.

Prunus corymbulosa Rydb., 1900, Cat. Fl. Mont., p. 226.
Cerasus trichopetala Greene, 1905, *in* Proc. Biol. Soc. Wash., v. 18, p. 60.
Prunus trichopetala Blankinship, 1905, *in* Mont. Agr. Coll. Sci. Studies, Bot., v. 1, No. 2, p. 70.
Prunus pennsylvanica saximontana Rehder, 1908, *in* Mitt. Deut. Dendrol. Gesell., No. 17, p. 160.

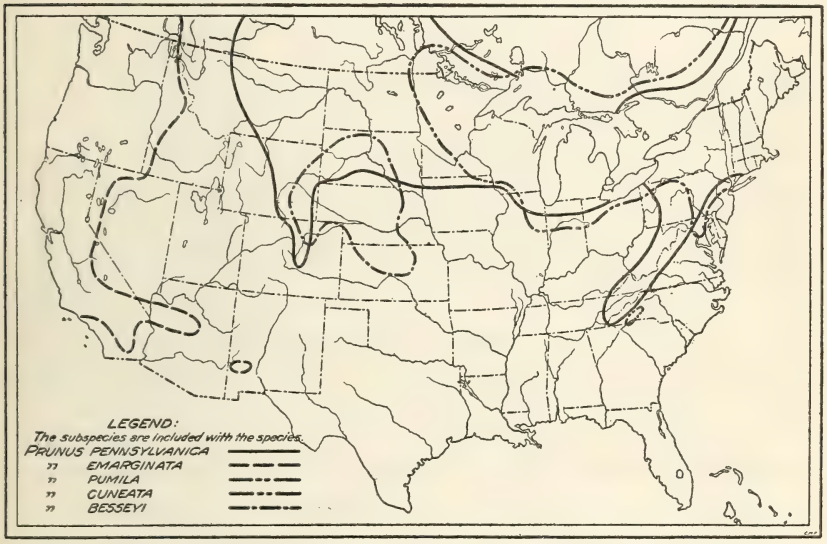


FIG. 4.—Outline map of the United States, showing the distribution of native American species of Prunus: *Pennsylvanica, emarginata, pumila, cuneata,* and *besseyi.*

Leaves ovate to ovate-lanceolate or sometimes oblong-oval (Pl. VI, fig. 2), narrowed toward the base, acute at the apex. Flowers 12 to 18 mm. broad, in sessile or sometimes pedunculate clusters of three to six. Stone slightly ovoid, about 6 mm. long.

The subspecies forms a small shrub, 3 to 6 feet high, differing from the species in its shrubby character and in the mature leaves being broader in proportion to their length, and in the stone being slightly ovoid instead of round-oval.

Prunus pennsylvanica saximontana was described from Colorado, Wyoming, and the Black Hills region of South Dakota and was distinguished from the type of *P. pennsylvanica corymbulosa* by its sessile

flower clusters, but this appears to be a variable character both in the species and subspecies. The earliest name is therefore used to designate the low western form which occurs from Fort McMurray, in about latitude 57°, Alberta, southward along the eastern slope of the Rocky Mountains to central Colorado.

The proposed species *Cerasus trichopetala* was based on a flowering specimen collected by R. S. Williams, at Columbia Falls, Mont., May 24, 1894. The specimen differs in no way from other material of the subspecies. *Prunus corymbulosa* was described from the Bridger Mountains and the Little Rocky Mountains, Mont.

PRUNUS EMARGINATA (Dougl.) Walp.

Cerasus emarginata Dougl., 1834, *in* Hook. Fl. Bor. Amer., v. 1, p. 169.
Prunus emarginata Walp., 1843, Repert. Bot., t. 2, p. 9.
Cerasus glandulosa Kellogg, 1854, *in* Bul. Cal. Acad. Sci., v. 1, p. 59.
Cerasus californica Greene, 1891, Fl. Franc., [pt.] 1, p. 50.
Cerasus crenulata Greene, 1905, *in* Proc. Biol. Soc. Wash., v. 18, p. 56.
Cerasus arida Greene, 1905, *in* Proc. Biol. Soc. Wash., v. 18, p. 57.
Cerasus prunifolia Greene, 1905, *in* Proc. Biol. Soc. Wash., v. 18, p. 57.
Cerasus rhamnoides Greene, 1905, *in* Proc. Biol. Soc. Wash., v. 18, p. 58.
Cerasus kelloggiana Greene, 1905, *in* Proc. Biol. Soc. Wash., v. 18, p. 58.
Cerasus padifolia Greene, 1905, *in* Proc. Biol. Soc. Wash., v. 18, p. 59.
Cerasus obliqua Greene, 1905, *in* Proc. Biol. Soc. Wash., v. 18, p. 59.
Cerasus parvifolia Greene, 1905, *in* Proc. Biol. Soc. Wash., v. 18, p. 59.
Cerasus obtusata Greene, 1905, *in* Proc. Biol. Soc. Wash., v. 18, p. 60.
Prunus prunifolia Shafer, 1908, *in* Britt. and Shaf., N. Amer. Trees, p. 500.

Leaves oblong-oval, obovate, or sometimes lanceolate (Pl. VI, fig. 3), 3 to 5.5 cm. long, 1 to 2 cm. broad, narrowed or even cuneate toward the base and obtuse or sometimes acute at the apex, the margins serrate and the teeth tipped with minute, pointed, sometimes incurved glands, the base furnished with two or more larger dark-colored glands, or sometimes eglandular, more or less pubescent as they unfold, the upper surface at maturity green and glabrous, the lower pale and glabrous or marked with a few scattered hairs; petioles 5 to 9 mm. long, glabrous or pubescent with short hairs; stipules lanceolate and glandular serrate. Flowers 10 to 15 mm. broad, appearing with the leaves from early in April to the middle of June, according to the locality and altitude, in corymbose clusters of 5 to 10; the pedicels subtended by small foliaceous dentate or laciniate bracts 6 to 14 mm. long, glabrous or nearly so; calyx glabrous, campanulate, the tube about 3.5 mm. long, the oblong or ovate-oblong obtuse lobes slightly shorter; petals obovate, entire or erose, 4 to 5 mm. long, glabrous or sparingly hairy on the outer surface toward the base. Fruit globose, 8 to 10 mm. in diameter, ripening from July to the end of September, bright red in color when first fully grown, changing to nearly black when ripe, flesh thin, bitter, and astringent; stone oval or slightly ovoid (Pl. XII, figs. 38 to 40),

somewhat pointed at each end, ridged on the ventral and rounded on the dorsal edge, about 7 mm. long, 5 mm. broad.

Prunus emarginata is a shrub 3 to 10 feet tall or becoming a small tree in favorable situations, bark of the trunk dark brown, smooth, and rather conspicuously marked with bands of lenticels, grayish brown on the branches and smaller stems, the young twigs usually glabrous, reddish, turning gray at the end of the season. It often forms dense shrubby thickets.

The species was originally described from specimens collected near Kettle Falls in the Columbia River Valley, northeast Washington, and ranges (fig. 4) from the upper Jocko River, in Montana, through the mountains of Idaho and Washington and from southern British Columbia southward in both the coast and interior mountains of California and western Nevada to the San Bernardino Mountains, reappearing in the San Jacinto and at South Peak in the Cuyamaca Mountains, in California. It occurs in the San Francisco Mountains, in Arizona, and has been collected as far east as Flagstaff; and specimens from the Mogollon and Black Mountains, in southwestern New Mexico, are also referable to this species. It occurs near streams and on moist benches, sometimes in dryish gravelly soils but more often in moist gravelly or more fertile soils. It reaches an elevation of 5,000 feet in the North, in the Sierra Nevada it has been found at 8,000 feet, in the San Rafael Mountains at 5,000 feet, in the San Jacinto Mountains at 9,000 feet, and in the San Francisco Mountains at 6,000 feet.

Prunus emarginata was originally described as a "low shrub, 4 to 8 feet high, with very red wood marked with white spots, and astringent fruit. The leaves are about 2 inches long, quite glabrous, as is the whole plant." The species is quite variable, as is to be expected when the range, covering such varied conditions as are found in the Pacific slope, is taken into consideration. The proposed species here reduced to synonomy undoubtedly show slight differences from the original, but a study of a large amount of material shows these forms to be connected with each other and with the type by innumerable gradations. *Cerasus crenulata* was described from the Mogollon and Black Mountains, N. Mex.; *C. arida* from "Borders of desert at eastern base of the San Bernardino Mountain," Cal.; *C. prunifolia*, "8,000 feet in the mountains of Fresno County, Cal."; *C. rhamnoides*, "Mud Springs, Amador County, Cal."; *C. kelloggiana* from mountains east of Chico and from near Quincy, Cal.; *C. padifolia*, foothills at Carson City, Nev.; *C. obliqua*, Oroville, Cal.; *C. parvifolia* from the vicinity of Mount Shasta, Cal.; and *C. obtusata* from Silvies, in southeastern Oregon. *C. glandulosa* was described from Placerville, Cal., and from the description and locality can not be other than this species. While variable, a study in the field fails to reveal other than minor varia-

tions due to differences in the conditions under which it is found in its wide range.

So far as known, the species has not been utilized in horticulture.

Prunus Emarginata Villosa Sudworth.

Cerasus mollis Dougl., 1834, *in* Hook. Fl. Bor. Amer., v. 1, p. 169.
Prunus mollis Walp., 1843, Report Bot., t. 2, p. 9. (Not *P. mollis* Torr., 1824.)
Cerasus erecta Presl., 1849, Epim. Bot., p. 194.
Prunus erecta Walp., Ann. 3: 854, 1852–53.
Cerasus pattoniana Carr., 1872, *in* Rev. Hort., Ann. 44, p. 135, fig. 17.
Prunus emarginata mollis Brewer, 1876, *in* Brewer and Wats. Bot. Calif., v. 1, p. 167.
Prunus emarginata villosa Sudw., 1897, U. S. Dept. Agr., Div. Forestry Bul. 14, p. 240.

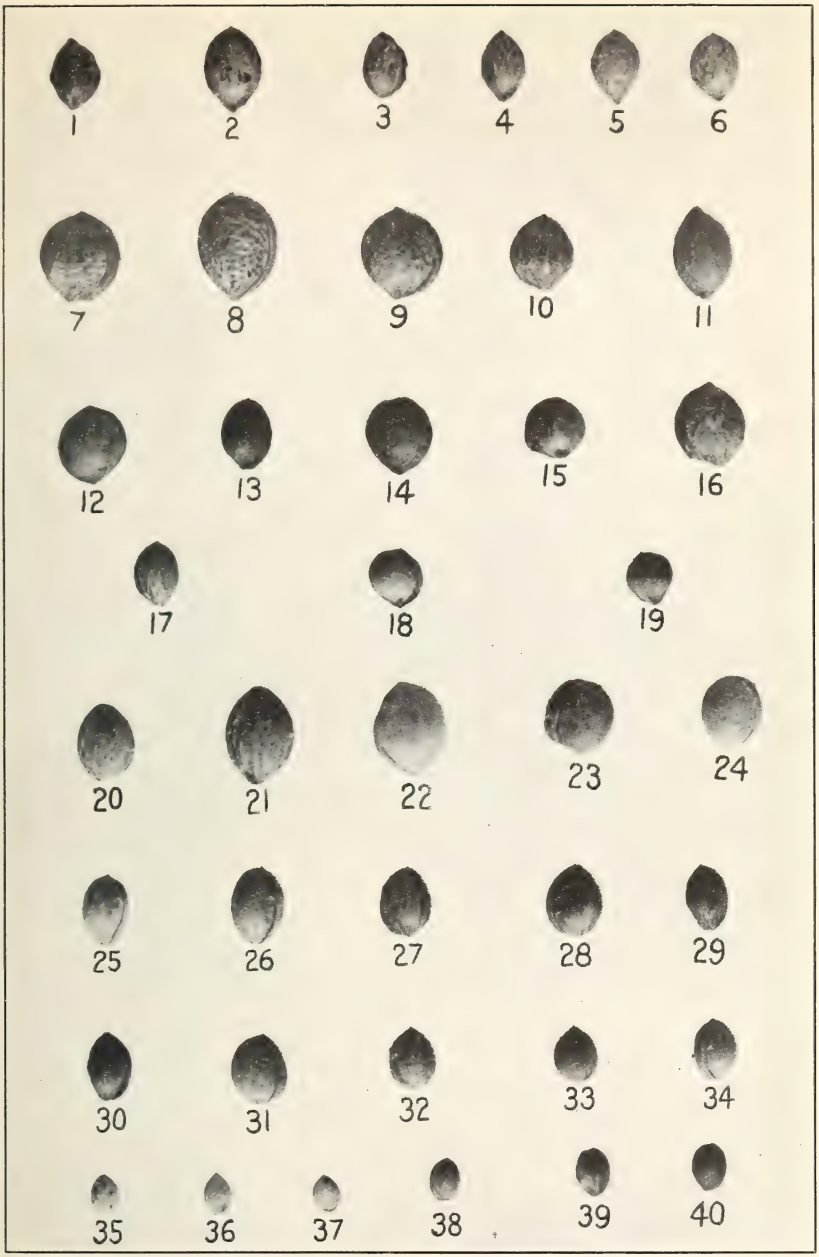
Leaves obovate to oval, 2 to 7 cm. long, or on vegetative shoots sometimes even 10 cm. long, 2 to 3 cm. broad, narrowed or cuneate at the base, obtuse or sometimes emarginate at the apex, more or less pubescent, at least on the lower surface. Flowers as in the species, except for the rather strongly pubescent pedicels and calyx tube, and the petals also more conspicuously pubescent. Fruit similar to the species.

The tree is 30 to 40 feet high with well-defined, straight trunk in the most favorable situations, the young twigs rather strongly pubescent.

This form is known to occur from the southern coast of Vancouver Island and southern British Columbia west of the mountains southward to southern Oregon. In the southern part of its range it occurs at an altitude of 4,000 feet, while in the north it is found only at low altitudes.

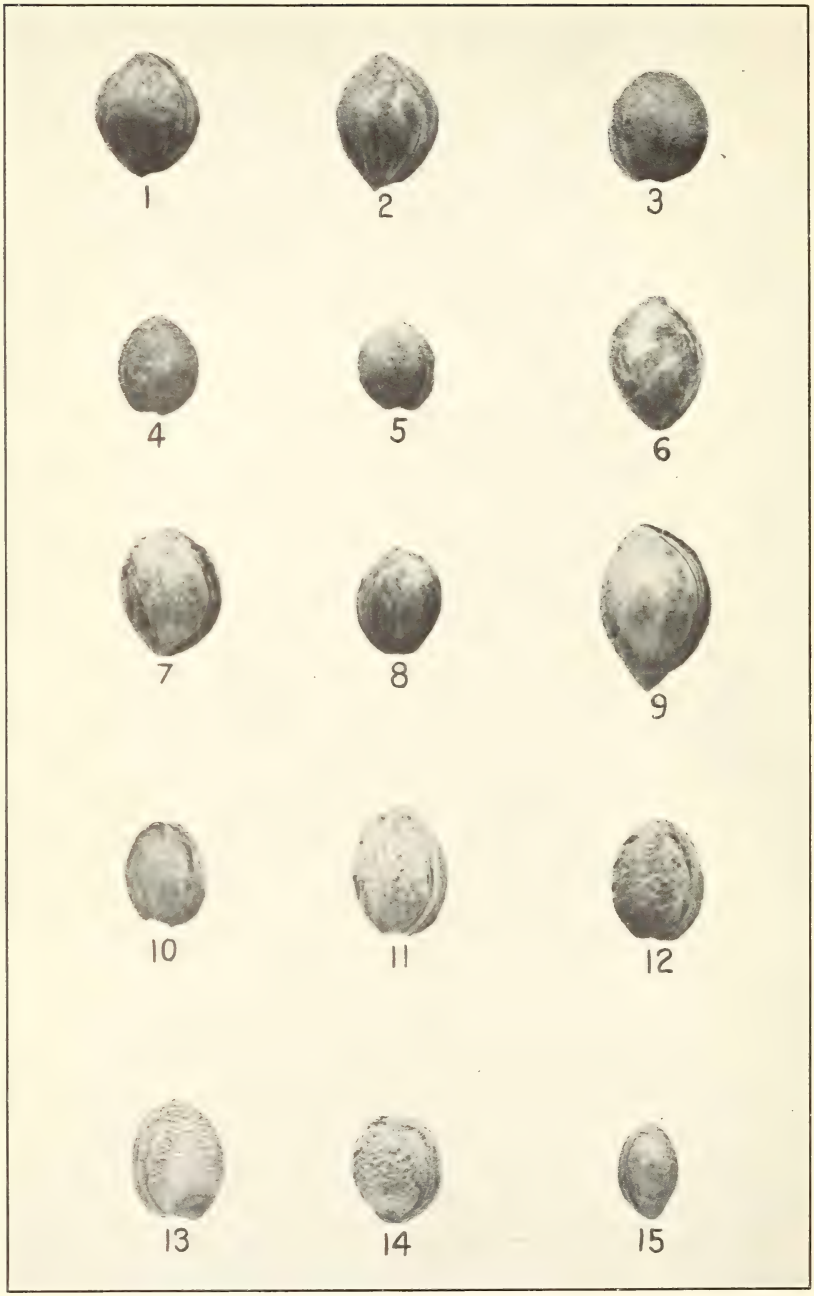
It was originally described from "near the mouth of the Columbia, and on subalpine hills, near the source of that river, Douglas; Fort Vancouver, Dr. Scouler." The specimens from near the source of the Columbia probably belong to the species. *Cerasus erecta* was described from Nootka Sound and from the description is plainly this form. *Cerasus pattoniana* was sent to the Muséum d'Histoire Naturelle, Paris, about 1865, by M. MacNab and is supposed to have come from northwest America, the exact locality being unknown; from the description and figure it is also this form. While *Prunus emarginata villosa* is quite unlike the species in habit and general appearance, it undoubtedly merges gradually with the species. More or less pubescent forms occur at various localities in California and in Arizona, but they are apparently of the smaller leaved, shrubby plant and are therefore referable to the species rather than to the subspecies.

This form has apparently not been utilized in pomology, but is sometimes planted as a shade tree and has been so used in Portland, Oreg.



STONES OF THE NATIVE AMERICAN SPECIES OF PRUNUS.—V.

FIGS. 1 to 3.—*P. alleghaniensis:* 1, From a tree in Huntingdon County, Pa.; 2 and 3, from Birmingham, Pa. FIGS. 4 to 6.—*P. alleghaniensis davisii:* From a tree in Montmorency County, Mich. FIGS. 7 to 13.—*P. umbellata:* 7 and 8, From Eustis, Lake County, Fla.; 9 and 10, from Jacksonville, Fla.; 11, from Athens, Ga.; 12, from Tavares, Lake County, Fla.; 13, from Marshall, Tex. FIGS. 14 to 17.—*P. maritima:* 14, From a tree in eastern Massachusetts; 15, from Atlantic City, N. J.; 16, from Cape May County, N. J.; 17, from Bucks County, Pa. FIGS. 18 and 19.—*P. gravesii:* From Groton, Conn. FIGS. 20 and 21.—*P. gracilis:* From near Denison, Tex. FIGS. 22 to 24.—*P. venulosa:* From near Denison, Tex. FIGS. 25 to 28.—*P. besseyi:* 25 and 26, Cultivated plant, Highland Park, Rochester, N. Y.; 27 and 28, wild plant, Custer County, Nebr. FIGS. 29 and 30.—*P. cuneata:* From Derry, N. H. FIGS. 31 to 34.—*P. pumila* (wild plants): 31, From Millers, Ind.; 32 and 33, from Saugatuck, Mich.; 34, from Minnesota. FIGS. 35 to 37.—*P. pennsylvanica:* From Saugatuck, Mich. FIGS. 38 to 40.—*P. emarginata:* From Oregon. (Natural size.)



STONES OF HYBRID VARIETIES OF PRUNUS.

FIG. 1.—*Prunus orthosepala*. FIGS. 2 to 15.—Hybrids: 2, Cultivated tree, Highland Park, Rochester, N. Y. (originally from Ellis, Kans.); 3, 4, and 5, Laire variety; 6, Surprise; 7 and 8, Hammer; 9, Ames; 10, *Prunus maritima* hybrid; 11 and 12, Marianna; 13, Six Weeks; 14, Maryland; 15, Compass. (Natural size.)

Prunus Pumila L.

(Sand cherry.)

Prunus pumila L., 1767, Mant. Pl., p. 75.
Cerasus canadensis Mill., 1768, Gard. Dict., ed. 8. (Not *Prunus canadensis* L.)
Cerasus glauca Moench., 1794, Meth. Pl., p. 672.
Prunus susquehanae Willd., 1809, Enum. Hort. Berol., [t. 1], p. 519.
Prunus depressa Pursh, 1814, Fl. Amer. Sept., v. 1, p. 332.
Prunus incana Schweinitz, 1824, *in* Long Narr. Exped., v. 2, p. 387.

Leaves narrowly oblanceolate (Pl. VII, fig. 3), 3 to 7 cm. long, 1 to 2 cm. broad, cuneate toward the base, acute at the apex, usually serrate, with appressed teeth, at least above the middle, the serrations sometimes inconspicuous, glabrous on both surfaces and pale, or even with a glaucous appearance below; petioles 7 to 10 mm. long, eglandular or with one or two glands near the apex, or sometimes with glands on the base of the blade; stipules linear and glandular serrate. Flowers appearing with or before the leaves from the first of May to the middle of June, about 12 mm. broad, usually in clusters of 3; pedicels 9 to 10 mm. long, slender and glabrous; calyx glabrous, the tube campanulate, about 2.5 or 3 mm. long, the oblong, obtuse lobes as long as the tube or nearly so, minutely glandular on the margin; petals oblong-oval, narrowed to a short claw, about 6 mm. long. Fruit nearly black, without bloom, globose, and about 10 to 15 mm. in diameter, ripening in the latter part of July and in August, covering a period of four weeks or more, even in the same locality, usually not of good quality but occasionally palatable; stone ovoid (Pl. XII, figs. 31 to 34), usually rounded at the base, somewhat pointed or obtuse at the apex, varying from about 9 mm. long, 5.5 mm. broad, and 5 mm. thick to 11 mm. long, 7.5 mm. broad, and 7 mm. thick, slightly grooved on either side of the ventral edge, but without a prominent ridge or wing, rounded and minutely grooved on the dorsal edge, usually with a few rather obscure, oblique grooves branching from the dorsal groove.

Prunus pumila is a shrub 1½ to 5 feet high, of willowlike habit, erect when young, the main stems later becoming more or less prostrate, but the growing branches erect; bark dark gray and marked with lighter-colored lenticels, the young twigs reddish, becoming dark reddish brown and finally gray.

Prunus pumila was originally described from Canada, and occurs (fig. 4) in gravelly or sandy or sometimes rocky localities along the shores of lakes or streams from eastern Quebec to Maryland, and westward to northern Indiana, eastern Minnesota, and the Lake of the Woods. It is especially abundant in the sand dunes along the shores of the Great Lakes, where it attains a much larger size than on the sandy plains of northern Michigan.

As yet apparently only one named variety of the species has been in cultivation, and it is probably of less value and has received less attention than its near relative, *Prunus besseyi*. The attention of horticulturists was called to the species many years ago. Andrew S. Fuller (25, p. 184) gives the following note, taken from his diary of 1846:

> August 3, 1846, Thunder Bay Islands, Lake Huron.—Visited Hat Island, and found dwarf cherry (*Cerasus pumila*) very abundant, the plants growing on the beach in almost pure sand; bearing stems depressed with the weight of fruit; wonderfully productive. Fruit one-half inch long and three-eighths broad; dark purple, nearly black, sweet, but rather insipid; suckers abundant, from the underground stems or roots.

This is followed by a discussion of a form (*P. besseyi*) seeds of which he had received from Utah.

Prunus pumila appears to have been first described by Duhamel (19, p. 149) as a Cerasus, but without a binomial name, and it is also included by Miller in the 1759 edition of the Gardener's Dictionary. Miller says the seeds were sent to him from Paris, under the title of "Ragouminier," which was the name given them in Canada, where they were also called "Nega" or "Minel." The seeds were sent to Miller by Bernard de Jussieu, and were planted in the Chelsea Garden. The tree flowered in May, and the fruit, according to Miller, ripened in July. Linnæus, in the second edition of the Species Plantarum, erroneously quoted Duhamel's description under *Prunus canadensis* L.

Prunus Pumila Hybrids.

Compass.—Leaves oblong or oblong-oval, 5 to 9 cm. long, 2.5 to 4 cm. broad, narrowed or rounded toward the base, acute or short acuminate at the apex, the margin conspicuously dentate with appressed rounded or glandular teeth, glabrous and dark green above, sparingly pubescent and pale below. Flowers appearing mostly before the leaves, about 18 mm. broad; pedicels about 6 mm. long; calyx tube campanulate, about 2 mm. long, equaled by the oblong lobes, the latter glandular and obscurely pubescent within or glabrous. Fruit dark red, nearly 2.5 cm. in diameter, ripening early in August; stone oval (Pl. XIII, fig. 15).

The originator (39; 40) of this hybrid writes as follows:

> This new fruit, which was originated by me, is a cross (which I made in the spring of 1891) between the sand cherry (*Prunus pumila*) and the Miner plum. It is botanically called a cherry. Years ago I received plants of the sand cherry, native to eastern Minnesota, from J. S. Harris.

Flowers of the sand cherry were pollinated with pollen from the Danish Morello cherry and from the Miner plum. Stamens were removed from only one blossom of the sand cherry, and the fruit resulting from this flower appears to have been the only one to receive

attention. This seed was planted and came up in the spring of 1892, and the seedling fruited in 1894.

If the sand-cherry parent of this hybrid came from eastern Minnesota, as stated, it could scarcely be *Prunus besseyi*, as has been suggested (5, p. 244), since the latter does not appear to occur in the eastern part of the State, but would be either *P. pumila* or *P. cuneata*, and since the former is apparently the most common, it is perhaps the species concerned. The hybrid is of little value, so far as the fruit is concerned, but it is of interest as being apparently the first attempt at hybridizing the sand cherry. No doubt its success and publication and the hybrid of the western sand cherry with the sand plum, known as the Utah hybrid, has suggested to horticulturists the possibility of securing something of value for the Plains region from *P. besseyi*.

Rupert.—The variety Rupert is reported by W. T. Macoun to be a hybrid of *Prunus pumila* with *P. americana*.

Prunus Cuneata Rafin.

Prunus cuneata Raf., 1820, Ann. Nat., p. 11.

Leaves broadly lanceolate (Pl. VII, fig. 4) or sometimes even obovate to elliptic or elliptic-obovate, 3.5 to 7 cm. long, 1 to 2.5 cm. broad, cuneate or gradually narrowed toward the base, obtuse or sometimes acute at the apex, usually serrate from below the middle or sometimes nearly to the base, green above and pale or even somewhat glaucouslike below; petioles 5 to 10 mm. long. Flowers and fruit similar to the preceding, but the stone usually slightly smaller (Pl. XII, figs. 29 and 30), being from 8 to 9 mm. long, 5.5 to 6.5 mm. broad, 5 mm. thick, and slightly pointed at the apex.

Prunus cuneata is an erect shrub, growing from 1 to 4 feet high, otherwise similar in habit to the preceding. It was first described from "the mountains of Pennsylvania," and occurs (fig. 4) sometimes in sandy, but more frequently in heavier soils, near lakes and about bogs, or other moist situations, from southern Maine and northern Vermont southward to the mountains of North Carolina and westward to Minnesota.

In flower, it is quite impossible always to distinguish *Prunus cuneata* in the herbarium from the preceding, but the young leaves are usually much broader in proportion to their length than in *P. pumila*, and they are nearly always strongly obtuse at the apex. Even mature foliage sometimes approaches *P. pumila* so closely as to render separation difficult, though they are usually much broader toward the base than in the former species. Nevertheless, the two appear to be well distinguished by habital characters. It has apparently not been utilized in horticulture; and, being smaller, it is probably less promising than either *P. pumila* or *P. besseyi*.

Prunus Besseyi Bailey.

(Western sand cherry.)

Prunus besseyi Bailey, 1894, N. Y. Cornell Agr. Exp. Sta. Bul. 70, p. 261.
Prunus pumila besseyi Waugh, 1899, Vt. Agr. Exp. Sta. Rpt. 12, p. 239.
Prunus rosebudii Reagan, 1907, *in* Ber. Deut. Bot. Ges., Jahrg. 25, Heft 6, p. 343.
Prunus prunella Daniels, 1911, *in* Univ. Mo., Studies, Sci. Ser., v. 2, no. 2, p. 151.

Leaves oval-elliptic or oblong-obovate (Pl. VII, fig. 5), rarely narrower and oblanceolate, 3 to 4.5 cm. long, 9 to 15 mm. broad, cuneate toward the base, acute or rarely obtuse at the apex, sharply serrate from below the middle, glabrous on both surfaces; petiole 5 to 6 mm. long; stipules linear and glandular serrate or sometimes slightly laciniate. Flowers appearing with or before the leaves in the prairie region from the last of April to the middle of May or at higher altitudes probably somewhat later, 10 to 12 mm. broad, in clusters of 3 to 4; pedicels and calyx glabrous; pedicels 6 to 7 mm. long, glandular; petals oblong-oval, narrowed to a claw, about 6 mm. long. Fruit nearly black or varying to red and yellowish, nearly globular or somewhat oblong, 15 to 18 mm. in diameter, ripening in August and September; stone nearly globose to somewhat ovoid (Pl. XII, figs. 25 to 28) 7.5 to 10 mm. long, 6 to 8 mm. broad, 5.5 to 6.5 mm. thick, rounded or even slightly truncate at the base and obtuse or somewhat pointed at the apex, grooved on either side of the ventral and along the dorsal edge.

Prunus besseyi is a dwarf, bushy shrub, 1 to 4 feet high, erect or often more or less prostrate, sprouting from the roots, though not forming a dense growth or thicket.

Its distribution (fig. 4) includes South Dakota, where it was collected by Geyer in 1839 on the "hills of Missouri near the mouth of Shian[1] [Cheyenne] River," to Nebraska and Kansas and the eastern slope of the Rocky Mountains, in Colorado and Wyoming.

The western sand cherry is distinguished from *Prunus pumila* by its more bushy habit and broader leaves, from *P. cuneata* by its more pointed leaves, and from both these species by its leaves being shorter in proportion to their width and more prominently serrate, by the shorter petioles, and by its usually larger fruit.

It was introduced into cultivation in 1892 as the "Improved Dwarf Rocky Mountain," by Charles E. Pennock (2, p. 60; 3, p. 159), of Bellvue, Colo., who says he first saw this cherry in 1878 along the Cache la Poudre River, about 8 miles from his farm. It had been cultivated in the gardens in the same country, however, at least a few years earlier than its discovery by Mr. Pennock (2, p. 60) along

[1] Nicollet (57, p. 143). The name of this river is spelled Shayen, and there can be little doubt that it is the stream designated by Geyer "Shian." The specimen is in the herbarium of the Missouri Botanical Garden.

the stream named above. This species has been quite extensively experimented with at the Minnesota and South Dakota Agricultural Experiment Stations and in Wisconsin. E. S. Goff (27) used it as a dwarf stock for the peach, which, on this stock, attained a height of 5 feet. Writing many years earlier, A. S. Fuller (25, p. 184–185) says:

> A few years ago, through the kindness of Prof. George Thurber, I received some cherry seeds from Utah Territory, and from them raised plants which appear to be of the same species * * * *P. pumila.* There is, however, considerable difference in the growth of the plants; the one grown from the seeds obtained from Utah being more erect, none of the branches trailing as in the species.

Discussing the question of crossing this species with the cultivated cherry, Mr. Fuller says:

> Here is an opportunity for the enterprising and skillful horticulturist to revolutionize cherry culture, and he who first produces a fruit equal to the Great Bigarreau, or Early Richmond cherry, and borne upon a shrub no larger than a currant bush * * * will be very likely to gather golden harvests for his labor.

It seems rather doubtful that this species is really found wild in Utah. The only specimen seen from Utah was collected by Dr. Edward Palmer, probably in 1870, though the specimen is labeled 1869. Dr. Palmer, it appears, collected only in the vicinity of St. George, in the extreme southwestern part of the State, and while there he was the guest of Mr. Johnson, with whom the Utah hybrid is supposed to have originated. It is almost certain, therefore, that Dr. Palmer's specimen was from the garden of Mr. Johnson's former home. Recent collectors in the State do not find the species, and it is very improbable that it is found anywhere on the western slope of the Rocky Mountains. The seeds mentioned by Fuller as having been obtained by Prof. George Thurber in Utah may also have come from Mr. Johnson's garden. It does not appear that Dr. Thurber was ever in Utah, and the seeds were probably received by correspondence during the time he filled the chair of botany and horticulture at the Michigan Agricultural College or soon after assuming the editorship of the American Agriculturist, in 1863. It should be noted also that from 1850 to 1861 Utah Territory embraced the western portion of what is now the State of Colorado, and while *Prunus besseyi* is not known to occur even within that area, it does occur at not a great distance east of the old boundary, and seeds from such a locality may have been wrongly ascribed to Utah.

An original specimen of *Prunus prunella* has been seen, and it is only *P. besseyi* with well-marked leaf serrations. From the description *P. rosebudii* must also be this species.

PRUNUS BESSEYI HYBRIDS.

× *Prunus utahensis* [1] Dieck., Koehne, 1893, Deut. Dendrol., p. 315.

Leaves oblong-oval to oval or rarely somewhat lanceolate in outline, slightly conduplicate, 3.5 to 5.5 cm. long, 1.5 to 2.5 cm. broad, gradually narrowed or sometimes rounded toward the base, acute at the apex, the margin crenate, the teeth gland tipped, glabrous on both surfaces; petioles 8 to 15 mm. long, pubescent along the upper edge or glabrous. Flowers appearing with the leaves, about 12 mm. broad; pedicels and calyx glabrous, pedicels about 8 mm. long; calyx tube about 2 mm. long, the oblong-ovate lobes as long as the tube, obscurely glandular; petals 6 to 7 mm. long. Fruit about 2.5 cm. in diameter, red, with a light bloom, poor in quality; stone similar in shape to that of *Prunus besseyi*.

This hybrid is an irregularly branched shrub 3 feet or more in height, showing some of the characters of both of its supposed parents, *Prunus besseyi* and *P. angustifolia watsoni*. It has also been crossed with *P. americana*. (Pl. XIII, fig. 14, Maryland).

The variety Montbesseyi is supposed to be a hybrid between the Montmorency cherry (*Prunus cerasus*) and *P. besseyi*. The leaves approach the size and form of *P. cerasus* very closely, but the flowers have not been examined.

In addition to the above hybrids, N. E. Hansen (30, p. 173, 192) has described a number of others reported as crosses with *Prunus americana, P. simonii, P. cerasifera atropurpurea, P. triflora, P. armeniaca,* and *Amygdalus persica*. Mr. Hansen writes that the hybrid with the last-named species is sterile.

The earlier hybrids produced do not appear to possess much merit; nevertheless, this field must be considered as offering some possibilities, and crosses between the best forms of *Prunus besseyi* and the variety known as "Laire," described under *P. orthosepala*, might afford a better fruit than the Utah hybrid.

NAMES PUBLISHED IN SYNONOMY OR ACCOMPANIED ONLY BY UNIDENTIFIABLE DESCRIPTIONS.

Prunus acinaria Desf., 1804, Tabl. Ecol. Bot. Mus., p. 179.

Name given without description, North America.

Prunus acuminata Hort., K. Koch, 1869, Dendrol., t. 1, p. 101.

Only incidental mention of horticultural material referred by Koch to *Prunus americana*.

Prunus californica Hort.

Cited by Koehne, 1893, Deuts. Dendrol., p. 312, as a synonym of *P. acuminata*. "Wildenow (ob auch Michaux?)." The plant de-

[1] For an account of the origin of this form, see Bailey, L. H. (4, p. 262, 265; 5, p. 244, 247).

scribed by Koehne under the latter name is *P. americana,* but since the name *P. californica* is given only in synonomy it is not a valid publication.

Prunus coccinea Raf., 1817, Fl. Ludov., p. 135.

Rafinesque's description was based on the following description by Bartram (9, p. 421):

* * * Plumbs, &c.; of the last mentioned genus, there is a native species grows in this island, which produces its large oblong crimson fruit in prodigious abundance; the fruit, though of a most enticing appearance, is rather too tart, yet agreeable eating, at sultry noon, in this burning climate; it affords a most delicious and reviving marmalade, when preserved in sugar, and makes excellent tarts; the tree grows about twelve feet high, the top spreading, the branches spiny and the leaves broad, nervous, serrated, and terminating with a subulated point.

This plum was observed on Pearl Island, La., probably between August 5 and 27, and could therefore scarcely have been *Prunus angustifolia.* In the fall of 1910 S. M. Tracy made a trip to Pearl Island, but found no Prunus, and he has since learned from those living in the vicinity that there have been no plum trees on the island within the past 40 years. About 25 or 30 years ago, however, a single wild tree, which has since died, was known on Isle au Pois on the east bank of Pearl River. In Bartram's time these trees may have been more abundant.

Prunus declinata Marsh., 1785, Arb. Amer., p. 112, "Dwarf plumb."

Marshall describes this as follows:

This is of a small dwarfish growth, seldom rising above 4 feet high, but frequently bearing fruit at the height of 2 or 3, which is small and almost black when ripe.

Although sometimes cited as a synonym of *Prunus maritima,* the fact that the beach plum was known to Marshall and that his description of *P. declinata* is quite as applicable to *P. pumila* renders the usual disposition of Marshall's name somewhat doubtful.

Prunus floribunda Hort., K. Koch, 1869, Dendrol., t. 1, p. 119.

Cited as a garden name for *P. pumila.*

× *Prunus hortulana robusta* Waugh, 1901, *in* Vt. Agr. Exp. Sta. Rpt. 14, 1900/01, p. 277.

This name was proposed by Waugh for a group of *Prunus triflora* hybrids which he designated the Gonzales group, and of which he considered the variety Gonzales the type. To this group he referred 30 varieties, hybrids (so far as the parentage is known) of *P. triflora* with *P. angustifolia, P. angustifolia varians, P. munsoniana,* and *P. hortulana.* Waugh's application of the name *hortulana* was not in its original usage, but to the Wild Goose group, *P. munsoniana,* while the variety Gonzales, although its parentage is not definitely

known, appears to be a hybrid of *P. triflora* with *P. angustifolia varians.*

Prunus mississippi Marsh., 1785, Arb. Amer., p. 112. "Crimson plumb."

Marshall's description of this species does not admit of identification. He says:

This grows naturally upon the Mississippi and is of larger size than most of the other kinds. The fruits are crimson colored and somewhat acid.

Prunus tawakonia Lindh., Gray, 1850, *in* Boston Jour. Nat. Hist., v. 6, p. 186.

Given only as a synonym of *P. rivularis.*

Prunus triflora. Raf., 1820, Ann. Nat., p. 11.

Rafinesque's description of this is as follows:

Arborescent, branches crooked and smooth, leaves subsessile, oblong lanceolate, acuminate, crenate, subobtuse; umbels sessile, commonly triflora; calyx acute, petals erose. A tree 20 feet high, probably a cherry tree. In the mountains of Pennsylvania. Flowers numerous, white, smelling strongly of honey.

LITERATURE CITED.

1. Adair, D. L
1869. Improvement of the native plum. *In* Amer. Jour. Hort. and Florist's Comp., v. 5, p. 139–148, illus.

2. Bailey, L. H.
1892. The cultivated native plums and cherries. N. Y. Cornell Agr. Exp. Sta. Bul. 38, 112 p., 14 fig.

3. 1893. Annals of Horticulture in North America for the Year 1892, 387 p., illus. New York.

4. 1894. The native dwarf cherries. N. Y. Cornell Agr. Exp. Sta. Bul. 70, p. 255–265, 5 fig.

5. 1898. Sketch of the Evolution of Our Native Fruits, 472 p., 125 fig. New York.

6. Barry, Patrick.
1852. The Fruit Garden . . . 398 p., 157 fig. New York.

7. Bartram, John.
1751. Observations on the Inhabitants, Climate, Soil, Rivers, Productions, Animals, and other Matters Worthy of Notice made by John Bartram in his Travels from Pennsylvania to Onondaga, Oswego and the Lake Ontario in Canada . . . 94 p., 1 pl. London.

8. Bartram, William.
1791. Travels through North & South Carolina, Georgia, East & West Florida, the Cherokee Country . . . 522 p., illus. Philadelphia.

9. 1792. Travels through North and South Carolina, Georgia, East and West Florida, the Cherokee Country . . . 520 p., illus., map. Philadelphia and London.

10. Beadle, D. W.
1872. Canadian Fruit, Flower and Kitchen Gardener.

11. Bridgeman, Thomas.
1840. Young Gardener's Assistant. Ed. 8.

12. Budd, J. L.
1870. The Miner and Chickasaw plum. *In* West. Pomol., v. 1, no. 2, p. 18.

13. Chapman, A. W.
[1897.] Flora of the Southern United States . . . ed. 3, 655 p. New York.

14. Cope, Eliphas.
1888. A Practical Treatise on Plum Growing, 45 p. New Lisbon, Ohio.

15. Coxe, William.
1817. A View of the Cultivation of Fruit Trees . . . 253 p., illus. Philadelphia.

16. 1851. Discovery and Conquest of Terra Florida by Don Ferdinando de Soto . . . written by a Gentleman of Elvas . . . and translated . . . by Richard Hakluyt. Reprinted from the Edition of 1611. Edited by William B. Rye, lxviii, 200 p., map. London.

17. Downer, J. S.
1871. Report on the wild goose plum. *In* Proc. 13th Sess. Amer. Pomol. Soc., 1871, p. 116–117.

18. Downing, A. J.
1845. Fruits and Fruit Trees of America . . . 594 p., illus. New York.

19. Duhamel du Monceau, H. L.
1755. Traité des Arbres et Arbustes . . . t. 1, 368 p., 139 pl. Paris.

20. 1835. Traité des Arbres Fruitiers . . . Nouvelle Édition Augmentée d'un Grand Nombre d'Espèces de Fruits Obtenus des Progrès de la Culture . . par A. Poiteau et P. J. F. Turpin, t. 2. Paris.

21. Elliott, F. R.
1854. Elliott's Fruit Book; or, the American Fruit Grower's Guide in Orchard and Garden, 503 p., illus. New York.

22. 1867. Newman plum. *In* Horticulturist, v. 22, no. 255, p. 271.

23. 1876. Hand-Book of Fruit Growers . . . 128 p., illus. Rochester, N. Y.

24. Fessenden, T. G.
1836. The New American Gardener . . . ed. 11, 306 p. Boston.

25. Fuller, A. S.
[1867] The Small Fruit Culturist, 276 p., 117 fig. New York.

26. Giddings, Alfred.
1872. The Miner or Hinckley plum. *In* Rpt. Iowa State Agr. Soc., 1871, p. 332–335.

27. Goff, E. S.
1896. A dwarf stock for the peach. *In* Gard. and Forest, v. 9, no. 454, p. 448.

28. Gronovius, J. F.
1743. Flora Virginica, 206 p. Lugduni Batavorum.

29. Hakluyt, Richard.
1810. Hakluyt's Collection of the Early Voyages, Travels, and Discoveries, of the English Nation. New ed., v. 3. London.

30. Hansen, N. E.
1911. Some new fruits. S. Dak. Agr. Exp. Sta. Bul. 130, p. 161–200, 13 fig.

31. Hedrick, U. P.
1911. The Plums of New York. 616 p., 99 pl. Albany. (N. Y. Dept. Agr. 18th Ann. Rpt., v. 3, pt. 2; N. Y. Agr. Exp. Sta. Rpt. 1910, pt. 2.)

32. Higley, W. K., and Raddin, C. S.
1891. The flora of Cook County, Illinois, and a part of Lake County, Indiana. *In* Bul. Chicago Acad. Sci., v. 2, no. 1, p. i–xxiii, 1–168.

33. Hooker, W. J.
1834. Flora Boreali-Americana . . . v. 1, 351 p., 158 pl. London.

34. Jefferson, Thomas.
1782. Notes on the State of Virginia, 391 p., illus. London.

35. Josselyn, John.
1865. New England's Rarities Discovered in Birds, Beasts, Fishes, Serpents and Plants of that Country . . . with an Introduction and Notes by Edward Tuckerman, 169 p., illus. Boston.

36. Kellogg, Albert.
1859. *In* Hutching's Magazine, v. 5, p. 7.

37. Kenrick, William.
1833. New American Orchardist, 423 p. Boston.

38. 1841. New American Orchardist. Ed. 3.

39. Knudson, H.
1896. The new hybrid sand cherry. *In* Ann. Rpt. Minn. State Hort. Soc., v. 24, p. 132–133.

40. Latham, A. W.
1896. A horticultural enthusiast. *In* Ann. Rpt. Minn. State Hort. Soc., v. 24, p. 416–417.

41. Lawson, John.
1718. History of Carolina . . . 258 p., map. London.

42. Lindley, George.
1846. Guide to the Orchard and Fruit Garden . . . with Additions of All the Most Valuable Fruits in America . . . by Michael Floy. New ed., 420 p., illus. New York.

43. Literary and Historical Society of Quebec.
1843. Voyages de Découverte au Canada, entre les Années 1534 et 1542. (Cartier, Jacques. Premier et Second Voyages, 1534 et 1535.) 130 p., illus. Quebec.

44. McAfee, H. H.
1871. Chickasaw plum. *In* Trans. Wis. State Hort. Soc., 1871, p. 94–95.

45. 1871. Chickasaw plums. *In* West. Pomol., v. 2, no. 9, p. 228.

46. 1871. Report of committee on plums. *In* Trans. North. Ill. Hort. Soc., 1871, p. 79–80.

47. 1874. [Outline of history of Miner plum.] *In* Ann. Rpt. Iowa State Hort. Soc. 1873, p. 152.

48. McCulloh, J. H.
1829. Researches, Philosophical and Antiquarian, Concerning the Aboriginal History of America, 535 p., illus., map. Baltimore.

49. Mackenzie, K. K., and Bush, B. F.
1902. New plants from Missouri. *In* Trans. Acad. Sci. St. Louis, v. 12, no. 7, p. 79–89, pl. 12–17.

50. M'Mahon, Bernard.
1806. American Gardener's Calendar . . . 648 p. Philadelphia.

51. Marshall, Humphrey.
1785. Arbustrum Americanum . . . 174 p. Philadelphia.

52. Miller, J. M. D.
1868. The wild goose plum. *In* Jour. Agr. [St. Louis], v. 3, no. 48, p. 741–742.

53. 1869. The wild goose plum. *In* South. Hort., v. 1, no. 1, p. 22–23.

54. 1867. [Miner plum.] *In* Amer. Agr., v. 26, no. 4, p. 128.

55. 1867. [Miner plum.] *In* The Horticulturist, v. 22, no. 257, p. 332–333.

56. Monette, J. W.
1846. History of the Discovery and Settlement of the Valley of the Mississippi . . . v. 1, 567 p., map. New York.

57. NICOLLET, I. N.
1843. Report Intended to Illustrate a Map of the Hydrographical Basin of the Upper Mississippi River, 170 p., map. Washington. (U. S. Cong., 2d Sess. Senate [Doc.] 237.)

58. ONDERDONK, G. (Texas.)
1891. Seed Catalogue.

59. PATTEN, C. G.
1883. The De Soto plum. *In* Trans. Iowa State Hort. Soc., 1882, p. 237–238. Discussion, p. 238–240.

60. PEEK, S. W.
1885. The Nursery and the Orchard . . . 208 p., illus.

61. PLUKENET, LEONARD.
1769. Almagestum Botanicum, 402 p. Londini.

62. PLUMS IN 1869.
1870. *In* Amer. Hort. Ann., 1870, p. 78.

63. PRINCE, WILLIAM.
1828. A Short Treatise on Horticulture . . . 196 p. New York.

64. 1831. The Pomological Manual . . . pt. 2, 216 p. New York.

65. ROBIN, C. C.
1807. Voyages dans l'Intérieur de la Louisiane, de la Florida Occidentale . . . suivis de la Flore Louisianaise, t. 3, 551 p. Paris.

66. SARGENT, C. S.
1892. Silva of North America . . . v. 4, 141 p., pl. 148–197. Boston and New York.

67. 1894. New or little-known plants.—Prunus orthosepala. *In* Gard. and Forest, v. 7, p. 184–185, fig. 25.

68. STEPHENS, H. B.
[1890.] Jacques Cartier and his Four Voyages to Canada . . . 163 p., pl. maps. Montreal.

69. STICKNEY, J. S.
1878. Our native plums. *In* Ann. Rpt. Iowa State Hort. Soc., 1877, p. 387.

70. THACHER, JAMES.
1825. American Orchardist . . . ed. 2, 236 p. Plymouth, Mass.

71. THOMAS, J. J.
1849. American Fruit Culturist . . . 407 p., 302 fig. Auburn, N. Y.

72. TRUE, C. H.
1889. Native plums. *In* Trans. Iowa State Hort. Soc. 23d Ann. Sess., 1888, p. 434–436. Discussion, p. 437–440.

73. W. W.
1868. The Miner plum. *In* Amer. Agr., v. 27, no. 2, p. 62.

74. WANGENHEIM, F. A. J. VON.
1781. Beschreibung einiger nordamericanischen Holz- und Buscharten, mit Anwendung auf teutsche Forsten . . . 151 p. Gottingen.

75. 1787. Beytrag zur teutschen holzgerechten Forstwissenschaft, die Anpflanzung nordamericanischer Holzarten, mit Anwendung auf teutsche Forste betreffend, 124 p., 31 pl. Gottingen.

76. WAUGH, F. A.
1901. Plums and Plum Culture . . . 371 p., illus. New York.

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1915

ADDITIONAL COPIES

OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
20 CENTS PER COPY